

# MARKET SURVEY

## Initial Program Requirements for the Terminal Flight Data Manager (TFDM)

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## 1 Background

### 1.1 Mission Need

The Terminal Flight Data Manager (TFDM) will provide Next Generation Air Transportation System (NextGen) mid-term and far-term capabilities as an integral portion of the Terminal Platform defined in the National Airspace System Enterprise Architecture (NASEA) Roadmap. TFDM is the primary contributor for Operational Improvement (OI) 104209: Initial Surface Traffic Management and supports the following other operational improvements, as identified in the NASEA:

OI 103207: Improved Runway Safety Awareness for Controllers

OI 104117: Improved Management of Arrival/Surface Departure Flow Operations

OI 104125: Integrated Arrival/Departure and Surface Traffic Management for Metroplex

OI 104206: Full Surface Traffic Management with Conformance Monitoring

OI 104207: Enhanced Surface Traffic Operations

OI 104208: Enhanced Departure Flow Operations

OI 107202: Low Visibility Surface Operations.

The NextGen Implementation Plan provides an overview of the Federal Aviation Administration's (FAA's) ongoing transition to the NextGen. The plan identifies implementation portfolios for capabilities that support NASEA mid-term operational improvements. TFDM is a key ground infrastructure in the plan for most phases of flight and supports the following implementation portfolios:

- Improved Surface Operations
- Time Based Flow Management.

### 1.2 Summary of Shortfalls

Many innovations required to achieve the operational improvements envisioned by the NextGen concept simply cannot be accommodated by current tower systems and operating procedures. In summary, the following operational shortfalls exist in the current Airport Traffic Control Tower (ATCT) infrastructure:

- Manual data-sharing processes prohibit efficient data sharing between tower positions or external stakeholders to collaborate for increased efficiencies and safety.
- Stove-piped systems with independent local processors, displays, and inputs devices consume limited tower space. No space to deploy additional capabilities to support NextGen capabilities.
- Increasing complexity of disparate systems with disparate computer human interfaces (CHI), including alarms, are increasing controller cognitive workload.
- Continuing reliance on voice communications for routine communications between Terminal Radar Approach Control Facilities (TRACONS), Air Route Traffic Control Centers (ARTCCs), pilots, airlines, and ramp towers limits controller time and frequency bandwidth to allow for greater information sharing among stakeholders and common situational awareness between control facilities.

The goal of the TFDM program is to address the current tower shortfalls by deploying an integrated terminal infrastructure for Tower that includes improved electronic communication with stakeholders to support NextGen capabilities. TFDM will serve as the automation platform for airports with an operating ATCT to support airport surface operations and aircraft activities in proximity of those airports. TFDM will

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consolidate tower systems, displays and input devices presently used in the airport tower. It will provide a capability to electronically process and distribute flight data to different control positions in the tower. TFDM will provide the controllers with surveillance information including associated alerts and alarms indicating potentially unsafe conditions. It will also contain a suite of integrated arrival/departure and surface management Decision Support Tools (DSTs) that will assist the controllers in performing their tasks while reducing their workload.

TFDM will be a highly integrated tower automation system using common data. The electronic processing and distribution of data will significantly enhance information exchange between the Tower ATC and the En Route ATC, Approach Control ATC, Traffic Flow Management (TFM), and Flight/Airline Operations domains. Additionally, DSTs will help improve the efficiency of airport operations via enhanced information exchange between the three ATC domains and flight operators and airport authorities.

TFDM will substantially alleviate the aforementioned shortfalls by enabling and/or providing the following key changes to tower operations:

- Automation of manual processes to reduce workload and expedite and enhance coordination;
- Consolidation of disparate tower flight data and automation systems into one system and integration of the existing tower displays into fewer displays and input devices;
- Integration of surface, arrival/departure, and traffic flow decision processes for maximizing airport throughput and reducing delays, including more capable and timely coordination between the tower and the traffic flow management system;
- Development and implementation of an advanced suite of DSTs to improve safety and optimize ATCT operations and providing interfaces to already available DSTs from other domains to increase operational efficiency and to reduce controller workload;
- Integration of more capable Collaborative Decision Making (CDM) processes, permitting collaboration between all stakeholders in tactical decision-making in the airport environment.

## 2 Operational Concept

### 2.1.1 Current Tower Operations

The FAA has jurisdiction over more than 500 ATCTs, with several classification levels based on factors including traffic volume, complexity, and sustainability of traffic. Presently, ATCT operations include several positions: Local Control (LC), Ground Control (GC), Flight Data (FD), Clearance Delivery (CD), Traffic Management Coordinator (TMC), and Front Line Manager/Controller-in-Charge (FLM/CIC). However, every tower does not need to individually staff all these positions. Towers at low-activity airports usually combine the functions provided by those positions according to local operational needs. In contrast, towers at higher-activity airports have additional positions such as Ground Metering/Gate Hold (GM/GH), coordination and support positions such as Cab Coordinator (CC) and Tower Associate (Local Assist), or multiples of local, ground, or other positions. Finally, some very large airports staff and operate multiple towers.

The tower personnel perform a number of ATC functions that include the following:

- Separate arrivals, departures, over flights, and flights in the local traffic pattern
- Provide advisories to Visual Flight Rules (VFR) traffic within their delegated airspace
- Separate VFR and Instrument Flight Rules (IFR) arrivals and departures on the runway
- Issue takeoff and landing clearances
- Coordinate interval spacing needs with the TRACON

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- Refine the arrival sequence by making speed adjustments and S-turn directions in delegated airspace or with approval of the TRACON in TRACON airspace
- Schedule and sequence departures
- Develop, revise, issue, and/or transmit departure clearances
- Assign arrival and departure runways
- Assign taxi routes
- Separate taxiing aircraft from aircraft arriving or departing on active runways
- Manage and separate surface traffic
- Implement traffic management initiatives (TMI) imposed by weather and flow constraints
- Observe weather elements, distribute weather information, and issue weather, traffic, and safety alerts
- Participate collaboratively in decisions regarding airport configuration
- Coordinate with personnel in en route and terminal facilities
- Perform administrative duties (reporting traffic counts, delays, etc.)
- Initiate airport rescue and fire fighting operations

A number of other personnel at other facilities are involved in tower; these include Traffic Management Coordinators (TMCs) in the TRACON and ARTCC, arrival and departure controllers in the TRACON, ramp tower personnel, and aircraft pilots/operators. These personnel maintain hotline and landline communications with tower personnel, and have limited access to the data available to the tower controllers.

Tower personnel use many systems to perform the following duties; they provide the following types of data exchange and capabilities:

- Display of surface and airborne traffic and surface collision hazard alerts
- Display of weather information: wind velocity, wind shear and microburst detection alerts
- Display of runway information and status
- Generation and display of flight plan and status data
- Automated delivery of departure clearance and airport information
- Display of facility information: clock, altimeter, airport charts, etc.
- Surface metering and other traffic management tools
- Air/ground voice communications
- Status display and control of airport and runway lighting
- Display of navigation equipment status
- Status display and control of tower equipment: batteries, generators, etc.



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## 2.1.2 TFDM Description

TFDM will modernize the tower automation infrastructure and provide a flexible, reliable, tower automation capability. In addition, TFDM will reduce delays and improve predictability, controller efficiency and airport capacity while reducing maintenance requirements. The roles and responsibilities of the air traffic management personnel will not change with the introduction of TFDM. However, the new technology provided by TFDM will enhance decision making and efficiency in the tower, improve coordination with air traffic management personnel in the TRACON and ARTCC, and will provide ramp towers and flight operators better situational awareness to facilitate collaborative decision making. The TFDM operational environment is shown in Figure 2-1 Terminal Flight Data Manager.

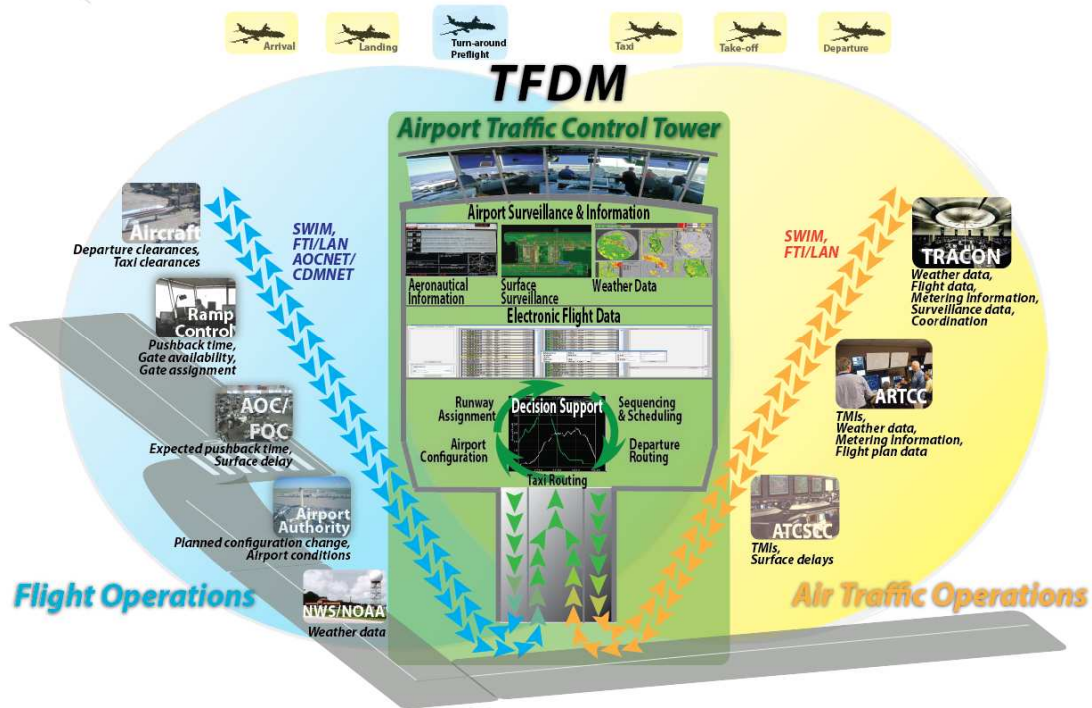


Figure 2-1 Terminal Flight Data Manager

TFDM will consist of the following service areas:

- **Flight Data Services (FDS)** - Electronically processes, displays, and distributes tower flight data. FDS records flight progress, including state changes as a flight moves through each control position during arrival and departure. FDS generates notifications (i.e. alerts/alarms/prompts) based on aircraft flight status and provides operational data (e.g., aircraft position, clearances and status information) for dissemination to aircraft, flight operations personnel, ramp tower controllers, and to en route/terminal/traffic management automation systems.
- **Surveillance Data Services (SDS)** - Receives, processes, displays, and distributes surveillance data from surface surveillance systems and controller inputs. SDS receives and displays conflict alerts from surface surveillance systems. SDS provides operational data (e.g., aircraft position) for dissemination to flight operations personnel, ramp tower controllers, and to traffic management systems.
- **Aeronautical Information Services (AIS)** - Enhances and/or subsumes existing information data management and display systems. AIS is an integrated service that collects, translates, formats, displays, distributes, exports, searches, stores, and archives Air Traffic control (ATC) static and dynamic data. This data is accessed by air traffic control specialists, traffic management



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specialists, and other NAS participants. The service subsumes and extends the functionality of existing integrated/ information display systems which reside in the terminal environment.

- **Airport Weather Services (AWS)** - Receives, processes, displays, and distributes weather data. Weather data includes 1) Altimeter settings 2) Terminal weather observations 3) Wind measurements 4) Runway Visibility 5) Windshear and microburst 6) Gust Front predictions 7) Convective weather and 8) Wake Vortex data.
- **Aircraft, Operator, and Pilot Services (AOPS)** - Subsumes existing Tower Data Link System (TDLS) functionality – including Digital Automatic Terminal Information Service (D-ATIS), Pre-Departure Clearances (PDC), and Departure Clearance (DCL) delivery. AOPS receives, processes, and electronically distributes aeronautical and control data and instructions to aircraft, pilots, and flight operators. The distribution of data and instructions is accomplished over several local and wide-area networks owned by the FAA and Data Link Service Providers (DLSPs).
- **Traffic Management Services (TMS)** - Provides airport traffic control tower users a two-way interface between the Tower and the traffic management systems used throughout the NAS. TMS allows tower users to send and receive TMI data with the Traffic Flow Management System (TFMS) as well as determine flight-specific compliance with TMI. It also enables the sharing of arrival and departure sequence data with the Time Based Flow Metering (TBFM) system. TMS is responsible for sending airport configuration and surface data to TFMS and TBFM. Finally, TMS provides recording, logging and calculation of metrics related to traffic flow management such as flight delays, taxi times and other pertinent information (e.g. runway closures, deicing, etc).
- **Decision Support Tools (DST)** - Decision Support Tools (DSTs) build upon a set of integrated analysis, prediction, and optimization functions. The DSTs provide custom depictions of data, analysis of options, warnings of problems, and suggestions for improving operations. They also support automated management processes and intelligent data distribution. The DSTs assist controllers in integrated arrival/departure management, collaborative decision making among all stakeholders, surface movement management, runway load balancing, and airport configuration management.
- **Terminal System Wide Information Manager (SWIM) Services** - Consists of a Tower local area network (LAN) and data adapters based on SWIM requirements. SWIM Services facilitates data exchange for existing and future tower automation systems with other National Airspace System (NAS) systems enabling common situational awareness and improved NAS agility. It provides a service-oriented architecture (SOA) interface for TFDM services to publish tower events to SWIM consumers or to reply to requests for data from other SWIM consumers. It also provides TFDM the ability to subscribe to or request data from other SWIM providers.
- **User Interface Services (UIS)** – Provides TFDM user-to-system interfaces for system utilization, control, and maintenance. UIS consists of all TFDM displays and input devices integrated into a cohesive, common interface platform. As TFDM consolidates legacy controller systems and adds new capabilities and functionalities, the UIS maintains and consolidates legacy interface characteristics while integrating the display of new information to enable increased user efficiency, enhanced situational awareness, and potential error reduction.
- **System Administration Services (SAS)** - Administration of functions that support ATC operations such as recording, playback, report generation, etc.
- **Monitor and Control (M&C)** - Monitoring, maintenance, and control of system software and hardware components and interfaces.

To reduce the number of stove piped and disparate systems, TFDM will consolidate displays, user input devices and/or processing of a number of systems. Some of the systems that will be partially or totally subsumed by TFDM include:

- Advanced Electronic Flight Strip (AEFS) System
- Airport Resource Management Tool (ARMT)
- Airport Surface Detection Equipment Model X (ASDE-X)

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- Airport Surface Surveillance Capability (ASSC)
- Automated Surface Observing System (ASOS) Controller Equipment Information Display System (ACE-IDS)
- Automated Weather Observing System (AWOS)
- Automated Weather Sensor System (AWSS)
- Clock
- Corridor Integrated Weather System (CIWS)
- Digital Altimeter Setting Indicator (DASI)
- Electronic Flight Strip Transfer System (EFSTS)
- Flight Data Input/Output (FDIO)
- Integrated Terminal Weather System (ITWS)
- Low Cost Ground Surveillance (LCGS)
- Low-Level Wind-shear Alert System (LLWAS)
- NAS Information Display System (NIDS)
- Ribbon Display Terminal (RBDT)
- Runway Visual Range (RVR)
- Stand-Alone Weather Sensors (SAWS)
- Terminal Doppler Weather Radar (TDWR)
- Tower Data Link Services (TDLS)
- Weather and Radar Processor (WARP)
- Weather System Processor (WSP)
- Wind Measuring Equipment (WME)

To increase data sharing between TFDM and other air traffic management stakeholders, TFDM will provide new and improved interfaces in the tower environment. TFDM will publish local tower data to SWIM and will publish to and/or subscribe from the following SWIM services:

- Aeronautical Common Services (ACS)
- Aeronautical Information Management (AIM)
- Airport Authorities
- Airport Geographical Information System (AGIS)
- Airport Surface Detection Equipment Model X (ASDE-X)
- Airport Surface Surveillance Capability (ASSC)

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- Corridor Integrated Weather System (CIWS)
- Data Link Service Provider (DLSP)
- En Route Automation Modernization (ERAM)
- Federal NOTAM System (FNS)
- Flight Operations Centers (FOC)
- Integrated Terminal Weather System (ITWS)
- Low Cost Ground Surveillance (LCGS)
- NextGen Surface Observing Capability (SOC)
- NextGen Network Enabled Weather (NNEW)
- Ramp Towers
- Remote Monitoring and Logging System (RMLS)
- Traffic Flow Management System (TFMS)
- Time-Based Flow Management (TBFM)

## 2.1.3 TFDM Implementation

TFDM will be scalable and configurable to operate in all FAA owned or operated ATCTs. TFDM will be implemented with configurations that are matched to the different types of operations, activity levels, operational configurations and capability needs among the various airports. On one extreme, TFDM will support the busiest NAS airports with primarily Air Carrier operations conducted under IFR with surface surveillance capabilities. These airports exhibit high volume and high complexity of operations and will implement all TFDM elements.

On the other extreme, TFDM will support less busy airports with a high percentage of VFR operations with no surface surveillance capabilities. These smaller airports do not need the full suite of TFDM DSTs due to their lower volume and complexity of operations. As a result, these airports may implement only those TFDM elements required for integration of flight planning within the larger NAS Air Traffic Management (ATM) system.

Airports in-between the two extremes will utilize TFDM capabilities as needed to support the NAS, their operational needs, and traffic mix. All TFDM configurations will be able to integrate and efficiently interact with En Route, TFM, flight operator, and airport authority systems.

The integration of functional capabilities into the TFDM automation platform is planned in phases comprising an initial Core Package succeeded by Work Package 1 and Work Package 2. The initial Core Package provides basic infrastructure to support NextGen tower automation functions identified in the NASEA and lays the foundation for additional functionalities in later work packages. Core capabilities include electronic flight data, surface surveillance data, traffic management (TM), aeronautical information, weather data, data link communications to pilots, early SWIM interfaces and limited DST capabilities in Airport Configuration (AC), Runway Assignment (RN), Sequencing and Scheduling (SS), and Taxi Routing (TX). The Core Package will also begin the consolidation of legacy tower equipment.

Work Packages 1 and 2 will build upon previous capabilities, while introducing new functions. Work Packages 1 and 2 will add new DSTs, including capabilities for Departure Routing (DR), and enhance Core DST capabilities. They will also introduce expanded data exchange between the tower and airport entities, additional SWIM interfaces, and additional consolidation of legacy equipment.

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This document addresses the program-level requirements for TFDM Core, Work Package 1, and Work Package 2. Requirements that apply to the Core system are labeled as “Core.” Requirements slated for either Work Package 1 or 2 are labeled as “WP.”

## **2.2 Maintenance**

Hardware and software maintenance will be in accordance with Order 6000.15, General Maintenance Handbook for National Airspace System (NAS) Facilities and Order JO 6000.51, ATO Organization Responsibilities for the Support of National Airspace System Terminal Automation Services.

### **2.2.1 Hardware Maintenance**

TFDM hardware maintenance and support levels will be in accordance with FAA Order 6000.15. Hardware maintenance will consist of two levels with a third level for logistical support. The first level maintenance will be performed by site personnel directly responsible for specific systems and will include periodic and corrective maintenance, system certification and modification, and system documentation. Second level engineering and technical support will be performed by personnel responsible for system type(s) and will include developing and publishing procedures, standards, and tolerances; developing certification procedures; configuration management, developing engineering modifications, and configuration management of Technical Instruction Books (TIBs). Third level support will be system logistical support which will be the responsibility of the FAA Logistic Center (FAALC) or the Original Equipment Manufacturer (OEM). It will include stocking and shipping spares, management of repair contracts with the OEMs, and may include repair of items at the FAALC. The TFDM system will be provided with the capability to interface and operate with the Remote Maintenance Monitor System (RMMS) and Remote Monitor and Logging System (RMLS).

### **2.2.2 Software Maintenance**

TFDM software maintenance will consist of two levels, site and second level. Site level maintenance will be limited to troubleshooting and minor software mitigations. Second level support will consist of engineering support for the site upon request to the appropriate National Engineering Support organization.

### **2.2.3 First-Level On-Site Support**

First level support is maintenance activities that are conducted on-site. These activities span all standard modes of operations: normal, degraded, emergency, failure, and recovery. TFDM first level support will be provided in accordance with FAA Order JO 6030.31, National Airspace System Failure Response.

### **2.2.4 Second Level Engineering Support**

Second level engineering support includes support for software, hardware, adaptation, and training elements of the system. The support includes task and problem solving beyond the capability of the local maintenance and includes latent defect resolution, test and evaluation, and system upgrades and releases.

## **2.3 Quantities and Location**

The Final Program Requirement Document (fPRD) will identify sites where TFDM will be located.

## **2.4 Schedule Constraints**

Schedule constraints will be delineated in the TFDM contract.

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## 3 Technical Performance

### 3.1 Operational and Functional Requirements

#### 3.1.1 General Requirements

#### 3.1.2 Flight Data Services (FDS)

##### 3.1.2.1 Receive Flight Data

###### 3.1.2.1.1 Receive En Route Automation Flight Plan Data {Core}

The TFDM System **shall** [1254] receive from En Route Automation Modernization (ERAM)/HOST the following flight plan data:

- a. NAS Flight Plan Data
- b. International Civil Aviation Organization (ICAO) Flight Plan Data

###### 3.1.2.1.2 Receive Message Acknowledgements {Core}

The TFDM System **shall** [1256] receive ERAM/HOST acknowledgement messages.

###### 3.1.2.1.3 Receive Terminal Automation Flight Data {Core}

The TFDM System **shall** [1257] receive terminal flight data from the following terminal automation systems to include:

- a. Automated Radar Terminal System IIE (ARTS)
- b. Standard Terminal Automation Replacement System (STARS)
- c. Terminal Automation Modernization and Replacement (TAMR)
- d. Microprocessor En Route Automated Radar Tracking System (MicroEARTS)

###### 3.1.2.1.4 Receive Gate & Ramp Assignments {Core}

The TFDM System **shall** [1259] receive gate assignments and ramp assignments from terminal automation.

##### 3.1.2.2 Create Flight Data

###### 3.1.2.2.1 Create Flight Data Messages {Core}

The TFDM System **shall** [1261] create ERAM/HOST flight plan messages based on user input.

###### 3.1.2.2.2 Reconstitute TFDM from ERAM Flight Data {Core}

The TFDM System **shall** [1708] reconstitute TFDM flight data from ERAM flight data based on user input (SWIM interface).

###### 3.1.2.2.3 Reconstitute ERAM from TFDM Flight Data {Core}

The TFDM System **shall** [1710] reconstitute ERAM flight data from TFDM flight data upon request (SWIM interface).

###### 3.1.2.2.4 Create Local Flight Data {Core}

The TFDM System **shall** [1262] create local flight data based on user input.

###### 3.1.2.2.5 Create Flight Data from Surveillance {Core}

The TFDM System **shall** [1263] create flight data based on surveillance data and user input.

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## 3.1.2.3 Process Flight Data

### 3.1.2.3.1 Validate Flight Data

#### 3.1.2.3.1.1 Validate Data {Core}

The TFDM System **shall** [287] validate the data of incoming messages from terminal and en route automation for the following:

- a. Format
- b. Completeness
- c. Coherence

#### 3.1.2.3.1.2 Generate Error Message {Core}

The TFDM System **shall** [1696] generate an error message for invalid incoming messages from terminal and en route automation.

#### 3.1.2.3.1.3 Record Error Message {Core}

The TFDM System **shall** [1698] record error messages.

#### 3.1.2.3.1.4 Discard Erroneous Message {Core}

The TFDM System **shall** [1699] discard erroneous incoming messages.

### 3.1.2.3.2 Update Flight Data

#### 3.1.2.3.2.1 Update Based on Adaptation {Core}

The TFDM System **shall** [583] update flight data based on site adaptation and local configuration.

#### 3.1.2.3.2.2 Update Based On User Input {Core}

The TFDM System **shall** [1266] update flight data based on user input.

#### 3.1.2.3.2.3 Apply Facility Notations {Core}

The TFDM System **shall** [234] apply facility notations to flight data based on user input.

#### 3.1.2.3.2.4 Apply Amendments {Core}

The TFDM System **shall** [275] apply flight plan amendments from the system that sends the original flight data.

#### 3.1.2.3.2.5 Merge Facility Notations {Core}

The TFDM System **shall** [1264] merge facility notations with flight data amendments received from ERAM/HOST.

#### 3.1.2.3.2.6 Update Based On Surveillance Data {Core}

The TFDM System **shall** [1265] update flight data based on surveillance data.

#### 3.1.2.3.2.7 Update Based On Traffic Management Initiatives (TMI) {Core}

The TFDM System **shall** [274] update flight data based on TMI.

#### 3.1.2.3.2.8 Provide Global Search Options {Core}

The TFDM System **shall** [277] have global search options available for flight data.

#### 3.1.2.3.2.9 Recall Previous Route Information {Core}

The TFDM System **shall** [278] recall previous route information based on user input.

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## 3.1.2.3.3 Update Flight State

### 3.1.2.3.3.1 Generate Departure Message {Core}

The TFDM System **shall** [1267] generate a departure message based on user input.

### 3.1.2.3.3.2 Generate Departure Message Based on Surveillance {Core}

The TFDM System **shall** [1268] generate a departure message based on surveillance inputs.

### 3.1.2.3.3.3 Reflect Flight State {Core}

The TFDM System **shall** [1269] update flight data to reflect the following flight state changes:

- a. At Gate
- b. Off Block
- c. Taxiing (including destination; e.g., runway, gate, de-icing pad, maintenance hangar)
- d. In Queue
- e. Departed
- f. Arriving

### 3.1.2.3.3.4 Update Flight Clearance Status {Core}

The TFDM System **shall** [1270] update flight data whenever an electronic departure clearance has been confirmed.

### 3.1.2.3.3.5 Provide Hold Function {Core}

The TFDM System **shall** [279] suspend processing of flight data based on user input.

### 3.1.2.3.3.6 Release Hold {Core}

The TFDM System **shall** [280] release flight data for processing based on user input.

### 3.1.2.3.3.7 Update Flight Data Based On Release {Core}

The TFDM System **shall** [1271] update flight data whenever a flight is on or released from hold.

## 3.1.2.3.4 Flight Data Notifications

### 3.1.2.3.4.1 Notify Flight Data Inconsistencies {Core}

The TFDM System **shall** [1276] notify users when inconsistencies exist between incoming flight data and the airport configuration such as:

- a. Assigning an Aircraft to a Closed Runway
- b. Assigning a Departure to an Arrival Runway

### 3.1.2.3.4.2 Notify Flight Data Changes {Core}

The TFDM System **shall** [1277] notify users of incoming flight data changes.

### 3.1.2.3.4.3 Notify Flight Data Actions {Core}

The TFDM System **shall** [1279] notify users when an action is required on flight data.

### 3.1.2.3.4.4 Notify Pending Flight Plan Timeout {Core}

The TFDM System **shall** [1280] notify users prior to an ERAM/HOST flight plan timeout.

### 3.1.2.3.4.5 Notify Flight Plan Timeout {Core}

The TFDM System **shall** [1281] notify users when an ERAM/HOST flight plan has timed out.



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## 3.1.2.3.5 Remove Flight Data

### 3.1.2.3.5.1 Remove Based on User Input {Core}

The TFDM System shall [1282] remove flight data from the display based on user input.

### 3.1.2.3.5.2 Remove Based on Adaptable Criteria {Core}

The TFDM System shall [1283] remove flight data from the display based on adaptable criteria.

### 3.1.2.3.5.3 Remove Flight Data based on Remove Strip Message {Core}

The TFDM System shall [1284] remove flights from the display within an adaptable time upon receipt of an ERAM/HOST remove strip message.

### 3.1.2.3.5.4 Recall Flight Data {Core}

The TFDM System shall [1285] recall flights for display based on user input.

## 3.1.2.3.6 Manage Surface Vehicle Data

### 3.1.2.3.6.1 Create Surface Vehicle Data {Core}

The TFDM System shall [1286] create surface vehicle data based on user input.

### 3.1.2.3.6.2 Update Surface Vehicle Data {Core}

The TFDM System shall [1287] update surface vehicle data based on user input.

### 3.1.2.3.6.3 Remove Surface Vehicle Data {Core}

The TFDM System shall [1288] remove surface vehicle data based on user input.

### 3.1.2.3.6.4 Display Surface Vehicle Data {Core}

The TFDM System shall [2004] display surface vehicle data.

### 3.1.2.3.6.5 Create Surface Vehicle Data Template {Core}

The TFDM System shall [2074] accept user input to create surface vehicle data templates.

### 3.1.2.3.6.6 Store Surface Vehicle Data Template {Core}

The TFDM System shall [2001] accept user input to store surface vehicle data templates containing pre-set values for data fields.

### 3.1.2.3.6.7 Retrieve a Stored Surface Vehicle Data Template {Core}

The TFDM System shall [2002] accept user input to retrieve a stored surface vehicle data template.

### 3.1.2.3.6.8 Modify a Stored Surface Vehicle Data Template {Core}

The TFDM System shall [2003] accept user input to modify the content of a retrieved, stored surface vehicle data template to create new surface vehicle data.

## 3.1.2.4 Distribute Flight Data

### 3.1.2.4.1 Distribute En Route Automation Flight Data

#### 3.1.2.4.1.1 Distribute Flight Data {Core}

The TFDM System shall [1289] distribute flight data to ERAM/HOST.

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## **3.1.2.4.1.2 Retransmit Flight Data {Core}**

The TFDM System **shall** [590] retransmit a flight data message to ERAM/HOST whenever an accept message is not received.

## **3.1.2.4.1.3 Submit Previous Route as Flight Plan Data Amendment {Core}**

The TFDM System **shall** [286] send previous route information as a flight plan amendment based on user input.

## **3.1.2.4.1.4 Acknowledgement Message to ERAM {Core}**

The TFDM System **shall** [589] acknowledge all messages from ERAM/HOST.

## **3.1.2.4.2 Publish Local Flight Data**

### **3.1.2.4.2.1 Publish Local Flight Data to Subscribers {Core}**

The TFDM System **shall** [1291] publish local flight data to subscribers.

### **3.1.2.4.3 Transfer Flight Data Among TFDM Positions**

#### **3.1.2.4.3.1 Transfer Flight Data Among ATCT Positions {Core}**

The TFDM System **shall** [1296] transfer flight data to TFDM operational positions based on user input

#### **3.1.2.4.3.2 Recall Flight Transfer {Core}**

The TFDM System **shall** [1297] recall a transfer of flight data to a TFDM operational position based on user input.

#### **3.1.2.4.3.3 Transfer Control of Flight Data {Core}**

The TFDM System **shall** [570] transfer control of flight data between operational positions based on user input.

#### **3.1.2.4.3.4 Route Incoming Flight Data {Core}**

The TFDM System **shall** [582] route incoming flight data to TFDM operational positions based on site adaptation and the current operational configuration.

#### **3.1.2.4.3.5 Transfer Flight Data Based on Site Adaptation {Core}**

The TFDM System **shall** [586] transfer flight data to TFDM operational positions based on site adaptation and the current operational configuration.

## **3.1.2.5 Display Flight Data**

### **3.1.2.5.1 Display of Flight Data {Core}**

The TFDM System **shall** [31] display flight data.

## **3.1.2.6 User Input of Flight Data**

### **3.1.2.6.1 Utilize Flight Plan Template {Core}**

The TFDM System **shall** [567] utilize a flight data template for entering new or amending flight plans.

### **3.1.2.6.2 Flight Data Template Characteristics**

#### **3.1.2.6.2.1 Create Flight Data Template {Core}**

The TFDM System **shall** [1303] create flight data templates based on user inputs.

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## **3.1.2.6.2.2 Utilize Pre-Set Values in Templates {Core}**

The TFDM System flight data templates **shall** [1714] contain flight data fields with pre-set values.

## **3.1.2.6.2.3 Store Flight Data Template {Core}**

The TFDM System **shall** [2005] accept user input to store flight data templates containing pre-set values for data fields.

## **3.1.2.6.2.4 Retrieve Stored Templates {Core}**

The TFDM System **shall** [569] retrieve a stored flight data template based on user input.

## **3.1.2.6.2.5 Modify a Stored Flight Data Template {Core}**

The TFDM System **shall** [2006] accept user input to modify the content of a retrieved, stored flight data template to create new flight data.

## **3.1.2.6.3 Search Flight Data {Core}**

The TFDM System **shall** [236] search flight data based on user input.

## **3.1.2.6.4 Select One or More Flights {Core}**

The TFDM System **shall** [238] select one or more flights based on user input.

## **3.1.2.6.5 Retain Copy of Flight Data {Core}**

The TFDM System **shall** [1711] retain a copy of flight data after transfer of control of that flight data based on user input.

## **3.1.2.6.6 Copy Selected Flight Data {Core}**

The TFDM System **shall** [243] copy selected flight data for one or more flights based on user input.

## **3.1.2.6.7 Store Copied Flight Data {Core}**

The TFDM System **shall** [2007] store copied flight data.

## **3.1.2.6.8 Retrieve Stored Copied Flight Data {Core}**

The TFDM System **shall** [2008] retrieve stored, copied flight data based on user input.

## **3.1.2.6.9 Display Selected Flight Data {Core}**

The TFDM System **shall** [245] display selected data for a flight based on user input.

## **3.1.2.6.10 Retrieve Previous Route {Core}**

The TFDM System **shall** [247] retrieve the previous route based on user input.

## **3.1.2.6.11 Distinguish Selected Flights {Core}**

The TFDM System **shall** [248] distinguish the display of selected flights based on user input.

## **3.1.2.6.12 Distinguish Selected Flight Data Fields {Core}**

The TFDM System **shall** [249] distinguish the display of selected flight data fields based on user display.

## **3.1.2.6.13 Retrieve Flight Data History {Core}**

The TFDM System **shall** [250] retrieve flight data history based on user input.

## **3.1.2.6.14 Resize Flight Data {Core}**

The TFDM System **shall** [251] resize flight data for display based on user input.

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## **3.1.2.6.15 Sort Flight Data {Core}**

The TFDM System **shall** [252] sort flight data for display based on user input.

## **3.1.2.6.16 Recall Sent Message {Core}**

The TFDM System **shall** [262] recall messages sent to ERAM/HOST based on user input.

## **3.1.2.6.17 Modify Messages {Core}**

The TFDM System **shall** [263] modify messages previously sent to ERAM/HOST in order to create a new message based on user input.

## **3.1.2.6.18 Create Flight Plan Amendments {Core}**

The TFDM System **shall** [265] create flight plan amendments from predefined lists.

## **3.1.2.6.19 Amend Flight Plan Fields {Core}**

The TFDM System **shall** [266] amend flight plans for multiple flights based on user input.

## **3.1.2.6.20 Update Flight Data Fields {Core}**

The TFDM System **shall** [2067] update flight data fields for multiple flights based on user input.

## **3.1.2.6.21 Send Previous Route {Core}**

The TFDM System **shall** [267] send the previous route as a flight plan amendment based on user input.

## **3.1.2.6.22 Notify of Message Rejection {Core}**

The TFDM System **shall** [911] notify a user when an entered message is not accepted by ERAM/HOST.

## **3.1.2.6.23 Display Messages Received {Core}**

The TFDM System **shall** [913] display messages received from ERAM/HOST.

## **3.1.3 Surveillance Data Services (SDS)**

### **3.1.3.1 Surface Surveillance System Data**

#### **3.1.3.1.1 Receive Surface Surveillance System Data {Core}**

The TFDM System **shall** [671] receive surface surveillance system data from the following systems:

- a. Airport Surface Detection Equipment Model X (ASDE-X)
- b. Low Cost Ground Surveillance (LCGS) (TBD)
- c. Airport Surface Surveillance Capability (ASSC)
- d. Automatic Dependent Surveillance - Broadcast (ADS-B) (TBD)

#### **3.1.3.1.2 Process Surface Surveillance System Data {Core}**

The TFDM System **shall** [672] process surface surveillance system data from the following systems:

- a. ASDE-X
- b. LCGS (TBD)
- c. ASSC
- d. ADS-B (TBD)

#### **3.1.3.1.3 Associate Flight Data with Surveillance Targets {Core}**

The TFDM System **shall** [2075] associate flight data with surveillance targets when the association is not provided by the surveillance system.

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## **3.1.3.1.4 Receive Terminal Automation Track Data {Core}**

The TFDM System **shall** [1301] receive terminal automation target and track data from the following systems:

- a. ARTS IIE
- b. STARS
- c. TAMR
- d. MicroEARTS

## **3.1.3.2 Display Surface Surveillance System Data**

### **3.1.3.2.1 Display Surface Surveillance System Data {Core}**

The TFDM System **shall** [951] display surface surveillance system data.

### **3.1.3.2.2 Display Airport Coverage Area {Core}**

The TFDM System **shall** [938] display aircraft and vehicles within the airport coverage area under all weather conditions.

### **3.1.3.2.3 Display to Operational Positions {Core}**

The TFDM System **shall** [674] display surface surveillance system data to operational positions.

### **3.1.3.2.4 Display Target with Single Track and ID {Core}**

The TFDM System **shall** [953] display each target by a single track with its associated identification (ID).

### **3.1.3.2.5 Display Target Track Data {Core}**

The TFDM System **shall** [954] display target track data received from the surface surveillance system to include:

- a. Position
- b. Velocity
- c. Mode 3A
- d. Mode C
- e. Beacon

### **3.1.3.2.6 Display Target Trail History {Core}**

The TFDM System **shall** [956] display a target trail history with an adaptable number of past positions.

### **3.1.3.2.7 Display Associated Flight Data with Target Data {Core}**

The TFDM System **shall** [961] display the associated flight data with the appropriate surveillance data.

### **3.1.3.2.8 Display Airport Coverage Area Maps {Core}**

The TFDM System **shall** [962] display the following airport coverage area maps:

- a. Runways
- b. Taxiways
- c. Ramps
- d. De-icing areas
- e. Other background area/significant geographical landmark depending upon site specific requirements

### **3.1.3.2.9 Display Unique Symbolology {Core}**

The TFDM System **shall** [965] display unique target symbolology to differentiate between aircraft and vehicles for the following:

- a. Vehicles and Aircraft
- b. Surface and Airborne Aircraft

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## **3.1.3.2.10 Display Associated Flight Data {Core}**

The TFDM System **shall** [1707] display the following data based on adaptation:

- a. Aircraft Identification (AID)
- b. Vehicle Identification
- c. Track Identification
- d. Scratch Pad Data
- e. Assigned Runway

## **3.1.3.3 Accept User Input Data**

### **3.1.3.3.1 Store Surface Surveillance Data Template {Core}**

The TFDM System **shall** [575] accept user input to store surface surveillance data templates containing pre-set values for data fields.

### **3.1.3.3.2 Retrieve a Stored Surface Surveillance Data Template {Core}**

The TFDM System **shall** [254] accept user input to retrieve a stored surface surveillance data template.

### **3.1.3.3.3 Modify a Stored Surface Surveillance Data Template {Core}**

The TFDM System **shall** [1311] accept user input to modify the content of a retrieved, stored surface surveillance data template to create new surface surveillance data.

### **3.1.3.3.4 Accept Facility Notations {Core}**

The TFDM System **shall** [255] apply facility notations to surface surveillance data based on user input.

### **3.1.3.3.5 Select Surface Surveillance Data {Core}**

The TFDM System **shall** [256] select surface surveillance data based on user input.

### **3.1.3.3.6 Remove Surface Surveillance Data {Core}**

The TFDM System **shall** [257] remove surface surveillance data from the display based on user input.

### **3.1.3.3.7 Resize Surface Surveillance Data {Core}**

The TFDM System **shall** [258] resize surface surveillance data based on user input.

### **3.1.3.3.8 Manually Sort Surface Surveillance Data {Core}**

The TFDM System **shall** [259] sort surface surveillance data for display based on user input.

### **3.1.3.3.9 Accept Manual Target Data Tagging {Core}**

The TFDM System **shall** [968] accept user input to enter data tagging for TFDM System targets where automatic tracking is not available.

### **3.1.3.3.10 Accept Manual Target Data Modification {Core}**

The TFDM System **shall** [969] modify data tags based on user input.

### **3.1.3.3.11 Assign Stored Aircraft Data Tag {Core}**

The TFDM System **shall** [2068] allow a user to assign a stored data tag to an aircraft.

### **3.1.3.3.12 Assign Stored Vehicle Data Tag {Core}**

The TFDM System **shall** [2069] allow a user to assign a stored data tag to a vehicle.

### **3.1.3.3.13 Display Aircraft Stored Data Tag List Access {Core}**

The TFDM System **shall** [970] display a list of stored data tags based on user input.

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## **3.1.3.3.14 Display Vehicle Stored Data Tag List Access {Core}**

The TFDM System **shall** [971] access a list of stored data tags for local based airport vehicles.

## **3.1.3.3.15 Store Airport Surveillance Configuration Maps {Core}**

The TFDM System **shall** [1915] store airport surveillance configurations maps based on user input.

## **3.1.3.3.16 Adapt Airport Surveillance Configuration Maps {Core}**

The TFDM System **shall** [972] adapt airport surveillance configurations maps based on user input.

## **3.1.3.3.17 Select Airport Surveillance Configuration Map Access {Core}**

The TFDM System **shall** [973] select surveillance maps during operations based on user input.

## **3.1.3.3.18 Add Map Temporary Areas {Core}**

The TFDM System **shall** [975] add temporary map areas to the surveillance configuration map in use based on user input.

## **3.1.3.3.19 Add Map Alphanumeric Data {Core}**

The TFDM System **shall** [976] add alphanumeric data to the surveillance configuration map in use based on user input.

## **3.1.3.3.20 Delete User Entered Data {Core}**

The TFDM System **shall** [978] delete user entered data when the surveillance configuration map is changed.

## **3.1.3.3.21 Ensure Target Presentation {Core}**

The TFDM System mapping **shall** [979] ensure target presentation.

## **3.1.3.3.22 Display Independent Map Windows {Core}**

The TFDM System **shall** [982] display independent surveillance configuration map information in each window.

## **3.1.3.4 Provide Notifications for Surveillance Data**

### **3.1.3.4.1 Receive Surface Surveillance Safety Alerts {Core}**

The TFDM System **shall** [675] receive surface surveillance system safety alerts.

### **3.1.3.4.2 Display Surveillance Data Notifications**

#### **3.1.3.4.2.1 Display Surface Surveillance Safety Alerts {Core}**

The TFDM System **shall** [1299] display simultaneous aural alarms and visual surface surveillance system safety alerts to operational positions.

#### **3.1.3.4.2.2 Suppress Surface Surveillance Alerts {Core}**

The TFDM System **shall** [1300] suppress the aural alarms and visual surface surveillance safety alerts based on user input.

## **3.1.4 Aeronautical Information Services (AIS)**

### **3.1.4.1 AIS General System Requirements**

#### **3.1.4.1.1 Receive Aeronautical Data {Core}**

The TFDM System **shall** [816] receive the following aeronautical data:



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- a. Airport Maps
- b. Aeronautical Charts
- c. Approach Plates
- d. Airport Diagrams
- e. Airspace Diagrams
- f. Notice to Airmen (NOTAM)

## **3.1.4.1.2 Translate Aeronautical Data {Core}**

The TFDm System **shall** [1358] translate aeronautical data.

## **3.1.4.1.3 Display Aeronautical Data {Core}**

The TFDm System **shall** [1360] display aeronautical data to operational positions.

## **3.1.4.1.4 Store Aeronautical Data {Core}**

The TFDm System **shall** [1362] store aeronautical data.

## **3.1.4.1.5 Retrieve Aeronautical Data {Core}**

The TFDm System **shall** [1363] retrieve aeronautical data.

## **3.1.4.1.6 Archive Aeronautical Data {Core}**

The TFDm System **shall** [1365] archive aeronautical data.

## **3.1.4.1.7 Sort Aeronautical Data {Core}**

The TFDm System **shall** [1366] sort aeronautical data based on user input.

## **3.1.4.2 Collect AIS Data**

### **3.1.4.2.1 Receive AIS Data {Core}**

The TFDm System **shall** [1367] receive data from the following Information Display Systems (IDS):

- a. NIDS
- b. ACE-IDS

### **3.1.4.2.2 Import AIS Aeronautical Data**

#### **3.1.4.2.2.1 Import Data Source File Types {Core}**

The TFDm System **shall** [817] import the following file types:

- a. Portable Document Formant (PDF)
- b. Joint Photographic Experts Group (JPG)
- c. Portable Network Graphics (PNG)
- d. Bitmap (BMP)
- e. HyperText Markup Language (HTML)
- f. Aeronautical Information Exchange Model (AIXM)
- g. Flight Information Exchange Model (FIXM)
- h. Universal Digital Data Standard (UDDS)
- i. Text (TXT)
- j. Rich Text Format (RTF)
- k. Microsoft Office formats

#### **3.1.4.2.2.2 Distribute AIS Formatted Display Pages {Core}**

The TFDm System **shall** [821] distribute display pages.

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## 3.1.4.2.3 Receive Time Input

### 3.1.4.2.3.1 Receive Primary Global Positioning System (GPS) Time {Core}

The TFDM System **shall** [1371] receive time from GPS Time Source (GTS).

### 3.1.4.2.3.2 Receive Secondary Time {Core}

The TFDM System **shall** [1553] receive secondary time from TBD.

## 3.1.4.2.4 Retrieve AIS Intranet Data

### 3.1.4.2.4.1 Retrieve Web Site Data {Core}

The TFDM System **shall** [1386] retrieve operational data from web sites on the NAS operational network. (TBD)

## 3.1.4.2.5 Receive AIS Legacy Interface Data

### 3.1.4.2.5.1 Receive General Information (GI) Messages From Flight Data Input/output (FDIO) System {Core}

The TFDM System **shall** [1388] receive GI messages from the FDIO System.

## 3.1.4.2.6 Input AIS Data

### 3.1.4.2.6.1 User Data Input {Core}

The TFDM System **shall** [1390] accept AIS data based on user input.

## 3.1.4.3 Transform AIS Data

### 3.1.4.3.1 Transform Messages to Plain English {Core}

The TFDM System **shall** [1394] transform NOTAMS into plain English when requested.

## 3.1.4.4 Display AIS Data

### 3.1.4.4.1 Display Dynamic AIS Data {Core}

The TFDM System **shall** [1397] display dynamic AIS data to include:

- a. Runway Configuration
- b. Local Airport Outages
- c. NOTAMS, including transformed NOTAMS

### 3.1.4.4.2 Display Static AIS Data {Core}

The TFDM System **shall** [1398] display static AIS data to include:

- a. Map
- b. Charts
- c. Letters of Agreement (LOAs)
- d. Handbooks

### 3.1.4.4.3 Preserve AIS Data Display {Core}

TFDM System **shall** [1401] display imported AIS data as received.

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## 3.1.4.4.4 Display AIS Interfaces

### 3.1.4.4.4.1 Timeout the Display of Expired Data {Core}

The TFDM System shall [1409] timeout display of data based on timeouts specified in the interface requirements documents (IRDs).

### 3.1.4.4.4.2 Data Timeout Indicator {Core}

The TFDM System shall [1654] notify users when a display has timed out.

## 3.1.4.5 Distribute AIS Data

### 3.1.4.5.1 Distribute AIS Data to Legacy IDS {Core}

The TFDM System shall [1410] distribute AIS data to legacy IDS.

## 3.1.4.6 Search AIS Data

### 3.1.4.6.1 Search AIS Text {Core}

The TFDM System shall [1415] search AIS text data based on user input.

### 3.1.4.6.2 Search AIS Graphics {Core}

The TFDM System shall [1416] search AIS graphics data based on user input.

## 3.1.4.7 Store & Retrieve AIS Data

### 3.1.4.7.1 Store AIS Data {Core}

The TFDM System shall [1417] store AIS data.

### 3.1.4.7.2 Retrieve AIS Data {Core}

The TFDM System shall [1916] retrieve stored AIS data based on user input.

## 3.1.5 Aircraft, Operator, Pilot Services (AOPS)

### 3.1.5.1 Process Pre-Departure Clearance (PDC) Messages

#### 3.1.5.1.1 Create PDC Messages {Core}

The TFDM System shall [1322] create PDC messages based on user input.

#### 3.1.5.1.2 Auto-Generate PDC Messages {Core}

The TFDM System shall [1324] generate default PDC messages for distribution to Flight Operations Centers (FOCs) and DLSPs based on airport configuration.

#### 3.1.5.1.3 Edit PDC Messages {Core}

The TFDM System shall [1325] accept edits of PDC messages based on user input.

#### 3.1.5.1.4 Display PDC Messages {Core}

The TFDM System shall [1326] display PDC messages.

#### 3.1.5.1.5 Address PDC Messages {Core}

The TFDM System shall [1328] address PDC messages to FOCs or DLSPs.

#### 3.1.5.1.6 Send PDC Messages {Core}

The TFDM System shall [1329] send PDC messages to FOCs or DLSPs.

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## **3.1.5.1.7 Receive PDC Acknowledgements {Core}**

The TFDM System **shall** [1330] receive acknowledgements of PDC messages when supplied.

## **3.1.5.1.8 Receive PDC Gate Assignments {Core}**

The TFDM System **shall** [1331] receive optional gate assignments when supplied.

## **3.1.5.1.9 Send ERAM PDC Updates {Core}**

The TFDM System **shall** [1332] send ERAM PDC updates based on affirmatively acknowledged PDC messages.

## **3.1.5.2 Process Digital Automated Terminal Information Service (D-ATIS) Messages**

### **3.1.5.2.1 Create and Publish D-ATIS Messages**

#### **3.1.5.2.1.1 Retrieve D-ATIS Message Data {Core}**

The TFDM System **shall** [1333] retrieve D-ATIS message data from current TFDM airport configuration data, weather sensors, and aeronautical data sources.

#### **3.1.5.2.1.2 Generate D-ATIS Text Messages {Core}**

The TFDM System **shall** [1334] generate D-ATIS messages from current TFDM airport configuration data, weather sensors, and aeronautical data.

#### **3.1.5.2.1.3 Add User Input to D-ATIS Message {Core}**

The TFDM System **shall** [1335] add text data to D-ATIS message based on user inputs.

#### **3.1.5.2.1.4 Display Current D-ATIS Message {Core}**

The TFDM System **shall** [1338] display the current D-ATIS message.

#### **3.1.5.2.1.5 Translate D-ATIS Text Message to Audio {Core}**

The TFDM System **shall** [1341] translate D-ATIS text messages to audio messages based on the D-ATIS dictionary.

#### **3.1.5.2.1.6 Playback D-ATIS Audio Messages {Core}**

The TFDM System **shall** [1339] playback D-ATIS audio messages.

#### **3.1.5.2.1.7 Edit D-ATIS Text Message {Core}**

The TFDM System **shall** [1765] accept user edits of D-ATIS text messages prior to distribution.

#### **3.1.5.2.1.8 Edit D-ATIS Audio Message {Core}**

The TFDM System **shall** [1766] accept user edits of D-ATIS audio messages prior to distribution.

#### **3.1.5.2.1.9 Display Past D-ATIS Messages {Core}**

The TFDM System **shall** [1336] display selected D-ATIS messages from preceding 24 hours based on user input.

#### **3.1.5.2.1.10 Edit Past D-ATIS Messages {Core}**

The TFDM System **shall** [1337] accept user edits of selected D-ATIS text messages to develop new D-ATIS messages.

#### **3.1.5.2.1.11 Distribute D-ATIS Text Message {Core}**

The TFDM System **shall** [1340] distribute current D-ATIS message in text to FOCs and DLSPs.

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## **3.1.5.2.1.12 Send D-ATIS Audio Message {Core}**

The TFDM System **shall** [1342] send current D-ATIS message to the Audio Distribution Unit (ADU) for local broadcast.

## **3.1.5.2.2 Manage D-ATIS Dictionary**

### **3.1.5.2.2.1 Load D-ATIS Dictionary Data {Core}**

The TFDM System **shall** [1767] load D-ATIS dictionary with local and national data.

### **3.1.5.2.2.2 Edit D-ATIS Dictionary Data {Core}**

The TFDM System **shall** [1768] accept text edits of D-ATIS dictionary data based on user inputs.

### **3.1.5.2.2.3 Display D-ATIS Dictionary Data {Core}**

The TFDM System **shall** [1769] display D-ATIS dictionary data.

### **3.1.5.2.2.4 Search D-ATIS Dictionary Data {Core}**

The TFDM System **shall** [1770] search D-ATIS dictionary data based on user inputs.

### **3.1.5.2.2.5 Review D-ATIS Dictionary Audio {Core}**

The TFDM System **shall** [1771] playback D-ATIS dictionary data audio pronunciations based on user inputs.

### **3.1.5.2.2.6 Edit D-ATIS Dictionary Audio {Core}**

The TFDM System **shall** [1772] accept user audio edits of D-ATIS dictionary data audio pronunciations based on user inputs.

## **3.1.5.3 Process Departure Clearance (DCL) and Other Controller Pilot Data Link Communications (CPDLC) Messages**

### **3.1.5.3.1 General**

#### **3.1.5.3.1.1 Provide Departure Clearance (DCL) Services {Core}**

The TFDM System **shall** [1777] provide departure clearance service for participating, equipped aircraft.

#### **3.1.5.3.1.2 Manage Session to Aircraft {Core}**

The TFDM System **shall** [1778] establish and maintain a CPDLC session with participating aircraft.

### **3.1.5.3.2 Display Departure Clearance Messages**

#### **3.1.5.3.2.1 Display DCL Message {Core}**

The TFDM System **shall** [1929] display departure clearance messages.

#### **3.1.5.3.2.2 Display Aircraft Communications Capability {Core}**

The TFDM System **shall** [1779] display participating aircraft data communications capabilities.

#### **3.1.5.3.2.3 Display Aircraft Data Communications {Core}**

The TFDM System **shall** [1781] display all data communications within selected time period based on user input.

#### **3.1.5.3.2.4 Display Aircraft Session Status {Core}**

The TFDM System **shall** [1780] display CPDLC session status with participating aircraft.

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## 3.1.5.3.3 Create Departure Clearance Messages

### 3.1.5.3.3.1 Create Departure Clearance (DCL) Message {Core}

The TFDM System **shall** [1274] create departure clearance messages based on controller input.

### 3.1.5.3.3.2 Accept Departure Clearance Request {Core}

The TFDM System **shall** [1783] accept departure clearance requests from participating aircraft.

### 3.1.5.3.3.3 Process Departure Clearance Request {Core}

The TFDM System **shall** [1784] process departure clearance requests from participating aircraft.

## 3.1.5.3.4 Revise Departure Clearance Messages

### 3.1.5.3.4.1 Revise Departure Clearance Messages on User Input {Core}

The TFDM System **shall** [1302] apply revisions to departure clearance messages based on user input.

### 3.1.5.3.4.2 Revise Departure Clearance Messages on Flight Plan Data Updates {Core}

The TFDM System **shall** [1788] issue a departure clearance revision upon receipt of revised flight plan data.

## 3.1.5.3.5 Process Terminations

### 3.1.5.3.5.1 Terminate Aircraft Session {Core}

The TFDM System **shall** [1790] terminate an aircraft CPDLC session when a flight plan changes to active.

### 3.1.5.3.5.2 Delete Pending Departure Clearances When Flight Activated {Core}

The TFDM System **shall** [1791] delete pending departure clearances for an aircraft when an aircraft's flight plan status changes to active.

### 3.1.5.3.5.3 Delete Pending Departure Clearances When Flight Plan Times Out {Core}

The TFDM System **shall** [1792] delete all pending departure clearances for an aircraft when an aircraft's flight plan expires.

## 3.1.5.3.6 Execute Departure Clearances in AUTOMODE

### 3.1.5.3.6.1 Create Departure Clearances in AUTOMODE {Core}

The TFDM System **shall** [1275] create initial, departure clearance messages for electronic delivery.

### 3.1.5.3.6.2 Send Departure Clearance in AUTOMODE {Core}

The TFDM System **shall** [1793] send CPDLC messages without controller intervention.

### 3.1.5.3.6.3 Revise Altitudes in AUTOMODE {Core}

The TFDM System **shall** [1794] allow AUTOMODE to revise altitude information in departure clearances.

### 3.1.5.3.6.4 Revise Routings in AUTOMODE {Core}

The TFDM System **shall** [1795] allow AUTOMODE to revise routing information in departure clearances.

### 3.1.5.3.6.5 Enable AUTOMODE {Core}

The TFDM System **shall** [1798] enable AUTOMODE based on user input.

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## **3.1.5.3.6.6    Disable AUTOMODE {Core}**

The TFDM System **shall** [1930] disable AUTOMODE based on user input.

## **3.1.5.3.7    Process Other CPDLC Messages**

### **3.1.5.3.7.1    Send CPDLC Messages {Core}**

The TFDM System **shall** [1799] send CPDLC messages to participating aircraft such as:

- a. Advisories
- b. Informational Messages
- c. Beacon Code Assignments
- d. Altimeter Settings
- e. Notification of Stuck Microphone

### **3.1.5.3.7.2    Accept CPDLC Requests {Core}**

The TFDM System **shall** [1931] accept CPDLC requests from participating aircraft.

### **3.1.5.3.7.3    Process CPDLC Requests {Core}**

The TFDM System **shall** [1800] process CPDLC requests from participating aircraft.

### **3.1.5.3.7.4    Reply to CPDLC Requests {Core}**

The TFDM System **shall** [1932] reply to CPDLC requests from participating aircraft.

### **3.1.5.3.7.5    Accept CPDLC Responses {Core}**

The TFDM System **shall** [1933] accept responses to CPDLC messages from participating aircraft.

### **3.1.5.3.7.6    Process CPDLC Responses {Core}**

The TFDM System **shall** [1801] process responses to CPDLC messages from participating aircraft.

## **3.1.5.4    Coordinate with Partners**

### **3.1.5.4.1    Coordinate with Flight Operations Centers (FOCs)**

#### **3.1.5.4.1.1    Receive FOC Data {WP}**

The TFDM System **shall** [1346] receive the following data from FOCs:

- a. Aircraft Gate/Stand/Parking Location
- b. Estimated Ready-for-Pushback Times
- c. Ready-to-Taxi Times
- d. Out and Off times
- e. Preferred-ordered set of all acceptable Departure Runways
- f. Preferred-ordered set of all acceptable Departure Routes for Each Flight
- g. Others TBD

#### **3.1.5.4.1.2    Display FOC Data {WP}**

The TFDM System **shall** [1347] display data received from FOCs by:

- a. Flight
- b. Selected list of flights
- c. Flights by Airline
- d. Flights by Departure Runway
- e. Flights by Gate or Gates

#### **3.1.5.4.1.3    Edit FOC Data {WP}**

The TFDM System **shall** [1348] accept user edits of FOC requests or preferences for replying to FOCs.



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## **3.1.5.4.1.4 Send Data to FOC {WP}**

The TFDM System **shall** [1349] send the following data to FOCs:

- a. On and In Times
- b. Others TBD

## **3.1.5.4.2 Coordinate with Data Link Service Providers (DLSPs)**

### **3.1.5.4.2.1 Receive DLSP Data {Core}**

The TFDM System **shall** [1934] receive data from DLSPs.

### **3.1.5.4.2.2 Display DLSP Data {Core}**

The TFDM System **shall** [1935] display data received from DLSPs.

### **3.1.5.4.2.3 Edit DLSP Data {Core}**

The TFDM System **shall** [1936] accept user edits of DLSP requests or preferences for replying to DLSPs.

### **3.1.5.4.2.4 Send Data to DLSP {Core}**

The TFDM System **shall** [1937] send data to DLSPs.

## **3.1.5.4.3 Coordinate with Ramp Towers**

### **3.1.5.4.3.1 Receive Ramp Tower Data {WP}**

The TFDM System **shall** [1350] receive the following data from Ramp Towers:

- a. Aircraft gate/stand/parking location
- b. Estimated ready-for-pushback times
- c. Ready-to-Taxi Times
- d. Out and Off Times
- e. Requirements for Aircraft to Undergo De-icing and De-icing

### **3.1.5.4.3.2 Display Ramp Tower Data {WP}**

The TFDM System **shall** [1351] display data received from Ramp Towers by:

- a. Flight
- b. Selected List of Flights
- c. Flights by Airline
- d. Flights by Departure Runway
- e. Flights by Gate or Gates

### **3.1.5.4.3.3 Edit Ramp Tower Data {WP}**

The TFDM System **shall** [1352] accept user edits of Ramp Tower requests or preferences for replying to Ramp Towers.

### **3.1.5.4.3.4 Send Data to Ramp Towers {WP}**

The TFDM System **shall** [1353] send the following data to Ramp Towers:

- a. On and in Times
- b. Others TBD

## **3.1.5.4.4 Coordinate with Airport Authorities**

### **3.1.5.4.4.1 Receive Airport Authority Data {WP}**

The TFDM System **shall** [1354] receive airport condition data from Airport Authorities to include:

- a. Airport Closures

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- b. Runway Closures
- c. Taxiway Closures
- d. Movement area Closures
- e. Gate Closures
- f. Others TBD

## **3.1.5.4.4.2 Display Data from Airport Authorities {WP}**

The TFDM System **shall** [1355] display data received from Airport Authorities.

## **3.1.5.4.4.3 Send Data to Airport Authorities {WP}**

The TFDM System **shall** [1356] send observed airport conditions to Airport Authorities to include:

- a. Birds on runway or near runway ends
- b. Pilot reported airport equipment outages
- c. Others TBD

## **3.1.6 Traffic Management Services (TMS)**

### **3.1.6.1 Receive Traffic Management Data**

#### **3.1.6.1.1 Receive Traffic Flow Management Data**

##### **3.1.6.1.1.1 Receive Traffic Management Initiatives (TMI) {Core}**

The TFDM System **shall** [1042] receive data from TFMS for the following traffic management initiatives:

- a. Ground Delay Programs (GDP)
- b. Ground Stops (GS)
- c. Airspace Flow Programs (AFP)
- d. Miles in Trail (MIT) Restrictions
- e. Minute in Trail (MINIT) Restrictions
- f. Request for extension of Flight Plan times

##### **3.1.6.1.1.2 Receive Estimated Departure and Arrival Times {Core}**

The TFDM System **shall** [1046] receive the following times from the TFMS Aggregate Demand List (ADL):

- a. TFMS Estimated Time of Departure (ETD)
- b. TFMS Estimated Time of Arrival (ETA)

##### **3.1.6.1.1.3 Receive Coded Departure Routes (CDRs) {Core}**

The TFDM System **shall** [1043] receive Coded Departure Routes (CDRs) from TFMS.

##### **3.1.6.1.1.4 Receive Flights to Reroute {Core}**

The TFDM System **shall** [1047] receive a list of flights needing reroutes from TFMS.

##### **3.1.6.1.1.5 Receive Departure Route Impact {WP}**

The TFDM System **shall** [1049] receive departure route impact reroute advisories data from TFMS.

#### **3.1.6.1.2 Receive Time-Based Flow Management Data**

##### **3.1.6.1.2.1 Receive Arrival Schedule {Core}**

The TFDM System **shall** [1061] receive arrival schedule data from TBFM.

##### **3.1.6.1.2.2 Receive Arrival Runway Data {Core}**

The TFDM System **shall** [1637] receive the TBFM arrival runway data.

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## **3.1.6.1.2.3 Receive Available Departure Times {Core}**

The TFDM System **shall** [1067] receive the set of flight-specific available departure times that comply with any Approval Request (APREQ) and Call For Release (CFR) constraints.

## **3.1.6.1.3 Accept User Input Data**

### **3.1.6.1.3.1 Accept User Input of TMIs {Core}**

The TFDM System **shall** [1634] accept traffic management initiative data based on user input.

### **3.1.6.1.3.2 Accept User Input of Routes {Core}**

The TFDM System **shall** [1635] accept alternate routes based on user input.

### **3.1.6.1.3.3 Accept User Input of Reroutes {Core}**

The TFDM System **shall** [1048] accept reroutes based on user input.

### **3.1.6.1.3.4 Accept User Input of APREQ/CFR Times {Core}**

The TFDM System **shall** [1646] accept APREQ/CFR times based on user input.

### **3.1.6.1.3.5 Accept User Input of Airport Configuration {Core}**

The TFDM System **shall** [1642] accept the following airport configuration information based on user input:

- a. Configuration name or title
- b. Runways in use
- c. Taxiways and taxiway segments in use
- d. Weight limitations
- e. Schedule
- f. Local airport outages/closures
- g. Scheduled airport configuration change (configuration and time)

### **3.1.6.1.3.6 Accept User Input of Airport Departure Rate (ADR) and Airport Arrival Rate (AAR) {Core}**

The TFDM System **shall** [1643] accept ADR and AAR information based on user input.

### **3.1.6.1.3.7 Accept User Input of Airport Information {Core}**

The TFDM System **shall** [1648] accept information pertaining to airport specific conditions based on user input:

- a. Hazardous conditions
- b. De-icing operations
- c. Emergency events
- d. Very Important Person (VIP) operations
- e. Construction

## **3.1.6.2 Process Traffic Management Data**

### **3.1.6.2.1 Calculate Arrival Traffic Counts {Core}**

The TFDM System **shall** [1081] calculate hourly arrival traffic counts.

### **3.1.6.2.2 Calculate Departure Traffic Counts {Core}**

The TFDM System **shall** [1918] calculate hourly departure counts.

### **3.1.6.2.3 Calculate Runway Utilization {Core}**

The TFDM System **shall** [1084] calculate individual runway utilization.

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## **3.1.6.2.4 Calculate Airport Utilization {Core}**

The TFDM System **shall** [1919] calculate airport utilization.

## **3.1.6.2.5 Calculate Flight Delays {WP}**

The TFDM System **shall** [1920] calculate the delay for each flight.

## **3.1.6.3 Send Traffic Management Data**

### **3.1.6.3.1 Send Data to TFMS**

#### **3.1.6.3.1.1 Send Compliance Notification {WP}**

The TFDM System **shall** [1051] send data to TFMS on a flight's compliance with an Expect Departure Clearance Time (EDCT).

#### **3.1.6.3.1.2 Send Reroute Notification {Core}**

The TFDM System **shall** [1052] send data to TFMS on whether a reroute was accepted or rejected.

#### **3.1.6.3.1.3 Send Estimated Departure Times {Core}**

The TFDM System **shall** [1053] send TFDM-calculated estimated departure times to TFMS.

#### **3.1.6.3.1.4 Send Taxi Data {Core}**

The TFDM System **shall** [1054] send the following TFDM times to TFMS:

- a. Actual arrival
- b. Actual off-block
- c. Actual start taxi
- d. Actual departure

#### **3.1.6.3.1.5 Send Flight State {Core}**

The TFDM System **shall** [1055] send the following TFDM flight state information to TFMS:

- a. At gate
- b. Off block
- c. Taxiing (including destination; e.g., runway, gate, de-icing pad, maintenance hangar)
- d. In queue
- e. Departed
- f. Arriving

#### **3.1.6.3.1.6 Send Updates to Flight State {Core}**

The TFDM System **shall** [1056] send updates to the flight state information to TFMS.

#### **3.1.6.3.1.7 Send Recommended Runway Assignment {Core}**

The TFDM System **shall** [2078] send the recommended runway assignment to TFMS.

#### **3.1.6.3.1.8 Send Runway Assignments {Core}**

The TFDM System **shall** [1057] send departure runway assignments to TFMS.

#### **3.1.6.3.1.9 Send Updates to Runway Assignment {Core}**

The TFDM System **shall** [1066] send departure runway assignment updates to TFMS.

### **3.1.6.3.2 Send Data to TBFM**

#### **3.1.6.3.2.1 Send Taxi Data {Core}**

The TFDM System **shall** [2079] send the following TFDM times to TBFM:

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- a. Actual arrival
- b. Actual off-block
- c. Actual start taxi
- d. Actual departure

## **3.1.6.3.2.2 Send Flight State {Core}**

The TFDM System **shall** [2080] send the following TFDM flight state information to TBFM:

- a. At gate
- b. Off block
- c. Taxiing (including destination; e.g., runway, gate, de-icing pad, maintenance hangar)
- d. In queue
- e. Departed
- f. Arriving

## **3.1.6.3.2.3 Send Recommended Runway Assignment {Core}**

The TFDM System **shall** [2077] send the DST-generated recommended runway assignment to TBFM.

## **3.1.6.3.2.4 Send Runway Assignment Data {Core}**

The TFDM System **shall** [1070] send departure runway assignment to TBFM.

## **3.1.6.3.2.5 Send Runway Schedule Prediction {Core}**

The TFDM System **shall** [1071] send departure runway schedule data to TBFM.

## **3.1.6.3.2.6 Send Runway Schedule Updates {Core}**

The TFDM System **shall** [1072] send updates to the departure runway schedule to TBFM.

## **3.1.6.3.2.7 Select Departure Slot Time {WP}**

The TFDM System **shall** [1069] allow users to select a departure slot time from the TBFM timeline based on user input.

## **3.1.6.3.2.8 Send Departure Slot Time {WP}**

The TFDM System **shall** [1922] allow users to send the selected departure slot time to TBFM.

## **3.1.6.3.2.9 Send TBFM Compliance Notification {WP}**

The TFDM System **shall** [1076] notify TBFM of flights that are non-compliant with TBFM constraints.

## **3.1.6.3.3 Publish Airport Information**

### **3.1.6.3.3.1 Publish Airport Configuration {Core}**

The TFDM System **shall** [1079] publish current and planned airport configuration information including:

- a. Configuration name or title
- b. Airspace configuration
- c. Runways in use
- d. Taxiways and taxiway segments in use
- e. Weight limitations
- f. Schedule
- g. Local airport outages/closures
- h. Scheduled airport configuration change (configuration and time)

### **3.1.6.3.3.2 Publish ADR and AAR {Core}**

The TFDM System **shall** [1080] publish current and planned ADR and AAR.

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## **3.1.6.3.3.3 Publish Airport Condition {Core}**

The TFDM System **shall** [1479] publish the following information pertaining to airport specific conditions:

- a. Extensive Gate Hold or Delay Operations
- b. Hazardous conditions
- c. De-icing operations
- d. Emergency events
- e. VIP operations
- f. Construction

## **3.1.6.3.3.4 Publish Airport Delay Data {WP}**

The TFDM System **shall** [1921] publish flight delay data.

## **3.1.6.4 Display Traffic Management Data**

### **3.1.6.4.1 Display TMI Data**

#### **3.1.6.4.1.1 Display TMI {Core}**

The TFDM System **shall** [1060] display TMI data including:

- a. NAS component affected (e.g. airport, fix, route)
- b. Start time
- c. End time
- d. Arrival Rate per hour
- e. List of impacted flights

#### **3.1.6.4.1.2 Display Route Impact {WP}**

The TFDM System **shall** [1638] display routes impacted by TMI.

#### **3.1.6.4.1.3 Display MIT/MINIT {Core}**

The TFDM System **shall** [1644] display MIT/MINIT information.

### **3.1.6.4.2 Display TBFM Data**

#### **3.1.6.4.2.1 Display Timeline Data for Arrivals {Core}**

The TFDM System **shall** [1064] display the TBFM timeline for arriving flights.

#### **3.1.6.4.2.2 Display Timeline Data for Departures {Core}**

The TFDM System **shall** [1077] display the TBFM timeline for departing flights.

#### **3.1.6.4.2.3 Display APREQ/CFR Flights {Core}**

The TFDM System **shall** [1645] display a list of flights affected by APREQ/CFR.

### **3.1.6.4.3 Display Surface Data**

#### **3.1.6.4.3.1 Display Airport Configuration {Core}**

The TFDM System **shall** [1639] display the current airport configuration.

#### **3.1.6.4.3.2 Display Fixes {Core}**

The TFDM System **shall** [1640] display the runway to fix mapping.

#### **3.1.6.4.3.3 Display Runway Schedule {Core}**

The TFDM System **shall** [1647] display a timeline showing the arrival and departure schedule for each runway.

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## **3.1.6.4.3.4 Display Delayed Flights {WP}**

The TFDM System **shall** [1086] display a list of flights that are delayed.

## **3.1.6.4.3.5 Display Delayed Flight Times {WP}**

The TFDM System **shall** [1475] display the amount of delay for each flight in the delayed flight list.

## **3.1.6.4.3.6 Distinguish Delayed Flights {WP}**

The TFDM System **shall** [1087] distinguish delayed flights by user-specified time bins.

## **3.1.6.4.3.7 Display Flights Taxiing {WP}**

The TFDM System **shall** [1088] display a list of all flights actively taxiing.

## **3.1.6.4.3.8 Display Taxi Flight Times {WP}**

The TFDM System **shall** [1476] display current flight specific taxi times on the taxi list.

## **3.1.6.4.3.9 Distinguish Taxi Display {WP}**

The TFDM System **shall** [1089] distinguish actively taxiing flights by their time spent taxiing by user-specified time bins.

## **3.1.6.5 Log Traffic Management Data**

### **3.1.6.5.1 Log Data {Core}**

The TFDM System **shall** [1058] automatically log all traffic management data upon receipt.

### **3.1.6.5.2 Enter Log Data {Core}**

The TFDM System **shall** [1059] allow data entries to the traffic management log based on user input.

### **3.1.6.5.3 Display Log {Core}**

The TFDM System **shall** [1923] display the traffic management log.

## **3.1.7 Airport Weather Services (AWS)**

### **3.1.7.1 Altimeter Setting**

#### **3.1.7.1.1 Receive Altimeter Setting {Core}**

The TFDM System **shall** [638] receive altimeter data from the following systems:

- a. NAS Information Display System (NIDS)
- b. ASOS Controller Equipment-Integrated Display System (ACE-IDS)
- c. Digital Altimeter Setting Indicator (DASI)
- d. Automated Surface Observing System (ASOS)
- e. Automated Weather Observing System (AWOS)
- f. Surface Observing Capability (SOC)
- g. Stand-Alone Weather Sensors (SAWS)
- h. Automated Weather Sensor System (AWSS)

#### **3.1.7.1.2 Process Altimeter Setting {Core}**

The TFDM System **shall** [639] process altimeter data.

#### **3.1.7.1.3 Distribute Altimeter Setting Data To External Users {Core}**

The TFDM System **shall** [1649] distribute altimeter data to external systems.

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## **3.1.7.1.4 Display Altimeter Setting {Core}**

The TFDM System **shall** [640] display altimeter data.

## **3.1.7.1.5 Accept User Input of Altimeter Setting {Core}**

The TFDM System **shall** [1650] accept altimeter settings based on user input.

## **3.1.7.2 Wind Data**

### **3.1.7.2.1 Receive Wind Data {Core}**

The TFDM System **shall** [642] receive wind data from the following systems:

- a. NIDS
- b. ACE-IDS
- c. Wind Measuring Equipment (WME)
- d. Low Level Wind Shear Alert Service (LLWAS)
- e. ASOS
- f. AWOS
- g. SOC
- h. Wind Shear Detection Services (WSDS)
- i. SAWS
- j. AWSS

### **3.1.7.2.2 Display Wind Data {Core}**

The TFDM System **shall** [645] display wind data.

### **3.1.7.2.3 Display Site Adaptable Wind Data {Core}**

The TFDM System **shall** [1651] display wind data using facility adaptable precedence order.

### **3.1.7.2.4 Accept User Input of Wind Data {Core}**

The TFDM System **shall** [1555] accept wind data based on user input.

## **3.1.7.3 Terminal Weather**

### **3.1.7.3.1 Receive Terminal Weather {Core}**

The TFDM System **shall** [646] receive terminal weather data from the following systems:

- a. ASOS
- b. AWOS
- c. SOC
- d. AWSS

### **3.1.7.3.2 Display Terminal Weather {Core}**

The TFDM System **shall** [649] display terminal weather conditions for:

- a. The Airport Surface
- b. The Terminal Area

### **3.1.7.3.3 Receive Data from Virtual Operator Interface Devices (VOID) {Core}**

The TFDM System **shall** [1387] receive data from VOIDs to include:

- a. ASOS
- b. AWSS
- c. AWOS



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## 3.1.7.4 Runway Visibility

### 3.1.7.4.1 Receive Runway Visual Range (RVR) {Core}

The TFDM System **shall** [651] receive RVR data.

### 3.1.7.4.2 Process RVR {Core}

The TFDM System **shall** [652] process RVR data.

### 3.1.7.4.3 Distribute RVR {Core}

The TFDM System **shall** [653] distribute RVR data.

### 3.1.7.4.4 Receive RVR Alarms {Core}

The TFDM System **shall** [655] receive RVR alarms.

### 3.1.7.4.5 Process RVR Alarms {Core}

The TFDM System **shall** [656] process RVR alarms.

### 3.1.7.4.6 RVR Display

#### 3.1.7.4.6.1 Display RVR {Core}

The TFDM System **shall** [654] display RVR data.

#### 3.1.7.4.6.2 Display RVR Alarms {Core}

The TFDM System **shall** [658] display simultaneous RVR aural alarms and visual alerts.

#### 3.1.7.4.6.3 RVR Low Visibility Alarm Threshold (LVAT) Alarm Value {Core}

The TFDM System **shall** [1556] allow the user to select a LVAT alarm value.

#### 3.1.7.4.6.4 Select Runway for Display {Core}

The TFDM System **shall** [1557] change the display of RVR based on user input.

#### 3.1.7.4.6.5 Acknowledge RVR Alarms and Alerts {Core}

The TFDM System **shall** [1656] acknowledge RVR visual alerts and audible alarms based on user input.

#### 3.1.7.4.6.6 RVR Display Intensity {Core}

The TFDM System **shall** [1657] change the RVR display appearance based on user input.

#### 3.1.7.4.6.7 RVR Alarm Intensity {Core}

The TFDM System **shall** [1658] change the RVR audio alarm intensity level based on user input.

## 3.1.7.5 Windshear

### 3.1.7.5.1 Receive Windshear {Core}

The TFDM System **shall** [659] receive wind shear data from the following systems:

- a. Integrated Terminal Weather System (ITWS)
- b. Terminal Doppler Weather Radar (TDWR)
- c. Low Level Windshear Alert System (LLWAS)
- d. Weather System Processor (WSP)
- e. Wind Shear Detection Services (WSDS)

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## **3.1.7.5.2 Process Windshear Data {Core}**

The TFDM System **shall** [660] process windshear data.

## **3.1.7.5.3 Distribute Windshear Data {Core}**

The TFDM System **shall** [661] distribute windshear data.

## **3.1.7.5.4 Display Windshear Data {Core}**

The TFDM System **shall** [662] display windshear data.

## **3.1.7.5.5 Display Windshear Data Alarms {Core}**

The TFDM System **shall** [1558] display simultaneous windshear data aural alarms and visual alerts when available.

## **3.1.7.5.6 Distribute Weather Messages {Core}**

The TFDM System **shall** [650] send the following messages to ERAM/HOST:

- a. Weather Message (WX)
- b. Altimeter Setting (AS)
- c. Weather Request (WR)

## **3.1.7.6 Microburst**

### **3.1.7.6.1 Receive Microburst Detection {Core}**

The TFDM System **shall** [663] receive microburst detection data from the following systems:

- a. Integrated Terminal Weather System (ITWS)
- b. Terminal Doppler Weather Radar (TDWR)
- c. Low Level Windshear Alert System (LLWAS)
- d. Weather System Processor (WSP)
- e. Wind Shear Detection Services (WSDS)

### **3.1.7.6.2 Process Microburst Detection Data {Core}**

The TFDM System **shall** [664] process microburst detection data.

### **3.1.7.6.3 Display Microburst Alarms {Core}**

The TFDM System **shall** [666] display simultaneous microburst detection aural alarms and visual alerts when available.

## **3.1.7.7 Gust Front**

### **3.1.7.7.1 Receive Gust Front {Core}**

The TFDM System **shall** [667] receive Gust Front prediction data from the following systems:

- a. ITWS
- b. NextGen Weather Processor (NWP)

### **3.1.7.7.2 Process Gust Front {Core}**

The TFDM System **shall** [668] process Gust Front prediction data and wind shift estimate.

### **3.1.7.7.3 Display Gust Front {Core}**

The TFDM System **shall** [670] display Gust Front prediction data and wind shift estimate.

### **3.1.7.7.4 Display Gust Front Alerts {Core}**

The TFDM System **shall** [1559] display Gust Front alarms.

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## 3.1.7.8 Convective Weather

### 3.1.7.8.1 Receive Convective Weather {WP}

The TFDM System **shall** [1659] receive the following convective weather data from ITWS:

- a. Lightning
- b. Tornado

### 3.1.7.8.2 Process Convective Weather {WP}

The TFDM System **shall** [1719] process convective weather data.

### 3.1.7.8.3 Display Convective Weather {WP}

The TFDM System **shall** [1721] display convective weather data.

## 3.1.7.9 Wake Vortex

### 3.1.7.9.1 Receive Wake Vortex Detection {WP}

The TFDM System **shall** [1661] receive notification from Wake Turbulence Mitigation for Departure (WTMD) when wind conditions allow for wake turbulence separation standards to be reduced for closely spaced runways. (TBD)

### 3.1.7.9.2 Provide Wake Category Timer {WP}

The TFDM System **shall** [2062] provide a timer for aircraft wake category.

### 3.1.7.9.3 Display Wake Category Timer {WP}

The TFDM System **shall** [2063] display a timer for aircraft wake category.

## 3.1.7.10 Weather Notification

### 3.1.7.10.1 Notify of Weather Deterioration {Core}

The TFDM System **shall** [1549] notify a user when weather deteriorates to a value that necessitates a change in airport operations.

### 3.1.7.10.2 Notify of Weather Improvement {Core}

The TFDM System **shall** [1550] notify a user when weather improves to a value that necessitates a change in airport operations.

### 3.1.7.10.3 Extract Meteorological Aviation Routine Weather Reports (METARS) {Core}

The TFDM System **shall** [1663] extract METARS from GI messages.

### 3.1.7.10.4 Display METARS {Core}

The TFDM System **shall** [1727] display METARS.

## 3.1.7.11 Transform Weather Messages

### 3.1.7.11.1 Transform Weather Messages to Plain English {Core}

The TFDM System **shall** [2076] transform Weather Messages into plain English when requested

## 3.1.7.12 User Input

### 3.1.7.12.1 Input Data to VOID {Core}

The TFDM System **shall** [1392] input data using VOIDS to include:

- a. ASOS

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- b. AWSS
- c. AWOS

## **3.1.7.12.2 Receive Weather Observation Augmentation {Core}**

The TFDM System **shall** [1728] receive weather observations based on user input.

## **3.1.7.12.3 Display Weather Observation Augmentation {Core}**

The TFDM System **shall** [1729] display weather observations based on user input.

## **3.1.8 Decision Support Tools (DSTs)**

*DST capabilities in this section include an alphanumeric code that identifies the DST category, number, and TFDM work package (Core, Work Package 1, or Work Package 2). For example, AC03-TC identifies Airport Configuration capability 03, included in TFDM Core. DR01-T1 identifies Departure Routing capability 01, included in TFDM Work Package 1.*

### **3.1.8.1 Configure Airport**

#### **3.1.8.1.1 Analyze, Implement, and Disseminate Airport Configuration Change (AC03-TC)**

##### **3.1.8.1.1.1 Analyze Potential Configuration Change**

###### **3.1.8.1.1.1.1 Analyze Potential Configuration {Core}**

The TFDM System **shall** [755] analyze a potential airport configuration based on user input of:

- a. Potential Airport Configuration
- b. Configuration Start Time

###### **3.1.8.1.1.1.2 Generate Runway Schedule {Core}**

The TFDM System **shall** [756] generate the runway schedule (see Sec. 3.1.8.4.1) resulting from the potential configuration change.

###### **3.1.8.1.1.1.3 Calculate Queuing/Congestion Impact {Core}**

The TFDM System **shall** [757] calculate the queuing/congestion impact of the configuration change.

###### **3.1.8.1.1.1.4 Display Runway Schedule {Core}**

The TFDM System **shall** [758] display the runway schedule resulting from the potential configuration change.

###### **3.1.8.1.1.1.5 Display Queuing/Congestion Impact {Core}**

The TFDM System **shall** [759] display the queuing/congestion impacts of the potential configuration change.

##### **3.1.8.1.1.2 Schedule Configuration Change**

###### **3.1.8.1.1.2.1 Schedule Configuration Change {Core}**

The TFDM System **shall** [760] schedule an airport configuration change based on user input of:

- a. Scheduled Airport Configuration
- b. Scheduled Airport Configuration Start Time

###### **3.1.8.1.1.2.2 Modify Scheduled Configuration Changes {Core}**

The TFDM System **shall** [1581] modify scheduled configuration changes based on user input.

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## **3.1.8.1.1.2.3 Cancel Scheduled Configuration Changes {Core}**

The TFDM System **shall** [1582] cancel scheduled configuration changes based on user input.

## **3.1.8.1.1.2.4 Notify Scheduled Configuration Change {Core}**

The TFDM System **shall** [761] notify the user of the scheduled airport configuration change.

## **3.1.8.1.1.3 Implement Configuration Change**

### **3.1.8.1.1.3.1 Activate Scheduled Configuration Change {Core}**

The TFDM System **shall** [762] activate scheduled airport configuration changes based on user input of:

- a. Last Flight(s) in Old Configuration
- b. First Flight(s) in New Configuration

### **3.1.8.1.1.3.2 Notify Configuration Change {Core}**

The TFDM System **shall** [763] notify the user of the airport configuration change.

### **3.1.8.1.1.3.3 Acknowledge Configuration Change {Core}**

The TFDM System **shall** [1583] accept user acknowledgment of configuration changes.

## **3.1.8.1.1.4 Maintain Set of Airport Configurations**

### **3.1.8.1.1.4.1 Store Set of Configurations {Core}**

The TFDM System **shall** [1584] store the set of airport configurations.

### **3.1.8.1.1.4.2 Display Set of Configurations {Core}**

The TFDM System **shall** [2016] display the set of airport configurations.

### **3.1.8.1.1.4.3 Add Configuration {Core}**

The TFDM System **shall** [765] add new airport configurations based on user input.

### **3.1.8.1.1.4.4 Delete Configuration {Core}**

The TFDM System **shall** [766] delete airport configurations based on user input.

### **3.1.8.1.1.4.5 Modify Configuration {Core}**

The TFDM System **shall** [767] modify airport configurations based on user input.

## **3.1.8.1.2 Recommend Configuration Change and Time (AC01-T1)**

### **3.1.8.1.2.1 Determine Allowable Airport Configurations {WP}**

The TFDM System **shall** [1821] determine the set of allowable future airport configurations based on:

- a. Weather forecasts
- b. Procedural constraints, including noise abatement rules and time of day constraints

### **3.1.8.1.2.2 Update Allowable Airport Configurations {WP}**

The TFDM System **shall** [1822] update the set of allowable future airport configurations whenever the following change:

- a. Weather forecasts
- b. Procedural constraints, including noise abatement rules and time of day constraints

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## **3.1.8.1.2.3 Calculate Queuing/Congestion Impacts of Configuration Changes {WP}**

The TFDM System **shall** [1823] calculate the queuing/congestion impacts of changing to each of the allowable airport configurations at user-selected future times.

## **3.1.8.1.2.4 Update Queuing/Congestion Impacts of Configuration Changes {WP}**

The TFDM System **shall** [1824] update the queuing/congestion impacts of changing to each of the allowable airport configurations at user-selected future times whenever the following change:

- a. Departure demand
- b. Arrival demand
- c. Set of allowable airport configurations

## **3.1.8.1.2.5 Generate Recommended Configuration Change {WP}**

The TFDM System **shall** [1825] generate a recommended a new configuration and configuration change time that minimizes queuing/congestion impacts.

## **3.1.8.1.2.6 Display Recommended Configuration Change {WP}**

The TFDM System **shall** [1826] display the recommended new configuration and configuration change time.

## **3.1.8.1.2.7 Schedule Configuration Change {WP}**

The TFDM System **shall** [1827] schedule the recommended configuration change based on user input.

## **3.1.8.1.2.8 Select Analysis Time Range {WP}**

The TFDM System **shall** [2014] select the time range for analyzing airport configuration changes based on user input.

## **3.1.8.2 Route Departures**

### **3.1.8.2.1 Display Flight-Specific Departure Route Indicator (DR01-T1)**

#### **3.1.8.2.1.1 Display Predicted Route Impacts**

##### **3.1.8.2.1.1.1 Display Weather Impacts {WP}**

The TFDM System **shall** [1828] display an indication of the weather impacts predicted for each flight's departure route at user-selected departure times, including the flight's TFDM-calculated departure time.

##### **3.1.8.2.1.1.2 Display TMI Impacts {WP}**

The TFDM System **shall** [1829] display an indication of the traffic management initiative impacts predicted for each flight's departure route at user-selected departure times, including the flight's TFDM-calculated departure time.

##### **3.1.8.2.1.1.3 Select Time Range {WP}**

The TFDM System **shall** [2015] select the time range for displaying weather and traffic management initiative impacts on departure routes based on user input.

#### **3.1.8.2.1.2 Display Route Status**

##### **3.1.8.2.1.2.1 Display Departure Route Status {WP}**

The TFDM System **shall** [1830] display a departure route status of Open or Closed for each departure flight.

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## **3.1.8.2.1.2.2 Display Expected Opening Time {WP}**

The TFDM System **shall** [1831] display the expected opening time for Closed departure routes.

## **3.1.8.2.1.2.3 Display Reroute Availability {WP}**

The TFDM System **shall** [1832] display whether reroutes are Available or Unavailable for flights with Closed departure routes.

## **3.1.8.2.1.2.4 Display Reroute Time {WP}**

The TFDM System **shall** [1833] display the time at which to expect a reroute for flights with Closed departure routes and Available reroutes.

## **3.1.8.3 Assign Runways**

### **3.1.8.3.1 Assign Departure Runway Based on Pre-Defined Rules (RN01-TC)**

#### **3.1.8.3.1.1 Generate Recommended Departure Runway {Core}**

The TFDM System **shall** [768] generate a recommended runway for each departure flight, based on:

- a. Flight data
- b. The scheduled airport configuration at the flight's TFDM-estimated time of departure (see Sec. 3.1.8.1.1)
- c. Runway and taxiway closures
- d. The departure runway assignment rule set (see Sec. 3.1.8.3.2)

#### **3.1.8.3.1.2 Update Recommended Departure Runway {Core}**

The TFDM System **shall** [1586] update departure runway recommendations whenever the following change:

- a. Flight data
- b. Airport configuration schedule
- c. Runway and taxiway closures
- d. The departure runway assignment rule set

#### **3.1.8.3.1.3 Display Recommended Departure Runway {Core}**

The TFDM System **shall** [1587] display the recommended departure runway.

#### **3.1.8.3.1.4 Assign Departure Runway {Core}**

The TFDM System **shall** [1588] assign a runway to a departure flight based on user input.

#### **3.1.8.3.1.5 Modify Departure Runway Assignment {Core}**

The TFDM System **shall** [769] modify departure runway assignments based on user input.

#### **3.1.8.3.1.6 Display Assigned Departure Runway {Core}**

The TFDM System **shall** [1589] display the assigned departure runway.

#### **3.1.8.3.1.7 Notify Nonstandard Departure Runway {Core}**

The TFDM System **shall** [1590] notify the user if a departure runway assignment is inconsistent with the airport configuration schedule.

### **3.1.8.3.2 Provide Real-Time Runway Assignment Rule Management and Use (RN08-TC)**

#### **3.1.8.3.2.1 Store Runway Assignment Rules {Core}**

The TFDM System **shall** [1585] store the set of runway assignment rules.

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## **3.1.8.3.2.2 Display Runway Assignment Rules {Core}**

The TFDM System **shall** [2017] display the set of runway assignment rules.

## **3.1.8.3.2.3 Add Runway Assignment Rule {Core}**

The TFDM System **shall** [770] add new runway assignment rules based on user input.

## **3.1.8.3.2.4 Delete Runway Assignment Rule {Core}**

The TFDM System **shall** [771] delete runway assignment rules based on user input.

## **3.1.8.3.2.5 Modify Runway Assignment Rule {Core}**

The TFDM System **shall** [772] modify runway assignment rules based on user input.

## **3.1.8.3.2.6 Enable Runway Assignment Rule {Core}**

The TFDM System **shall** [773] enable runway assignment rules based on user input.

## **3.1.8.3.2.7 Disable Runway Assignment Rule {Core}**

The TFDM System **shall** [774] disable runway assignment rules based on user input.

## **3.1.8.3.3 Process Flight-Specific Departure Runway Assignment Information from Flight Operators (RN07-T1)**

### **3.1.8.3.3.1 Utilize Flight Operator Provided Runway Information {WP}**

The TFDM System **shall** [1805] utilize each flight's preference-ordered list of operationally acceptable runways and intersections when generating a recommended departure runway.

### **3.1.8.3.3.2 Update Departure Runway Recommendations {WP}**

The TFDM System **shall** [1806] update departure runway recommendations whenever preference-ordered lists of operationally acceptable runways and intersections change.

### **3.1.8.3.3.3 Display Flight Operator Provided Runway Information {WP}**

The TFDM System **shall** [1807] display each flight's preference-ordered list of operationally acceptable departure runways and intersections.

### **3.1.8.3.3.4 Modify Flight Operator Provided Runway Information {WP}**

The TFDM System **shall** [1808] modify a flight's preference-ordered list of operationally acceptable departure runways based on user input.

### **3.1.8.3.3.5 Notify Unacceptable Runway Assignment {WP}**

The TFDM System **shall** [1809] notify the user when a departure runway and intersection is assigned that is not in a flight's list of operationally acceptable departure runways and intersections.

## **3.1.8.3.4 Analyze Manually Entered Runway Assignment (RN02-T1)**

### **3.1.8.3.4.1 Calculate Effects of Runway Change {WP}**

The TFDM System **shall** [1810] calculate runway schedule changes and flight-specific delay changes based on user input of a runway assignment change.

### **3.1.8.3.4.2 Display Effects of Runway Change {WP}**

The TFDM System **shall** [1811] display runway schedule changes and flight-specific delay changes resulting from a runway assignment change.



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## 3.1.8.3.5 Balance Departure Loads on Runways (RN03-T1)

### 3.1.8.3.5.1 Perform Load Balancing

#### 3.1.8.3.5.1.1 Detect Capacity/Demand Imbalances {WP}

The TFDM System **shall** [1876] detect runway capacity/demand imbalances.

#### 3.1.8.3.5.1.2 Recommend Runway Assignments {WP}

When a runway capacity/demand imbalance is detected and runway load balancing is enabled, the TFDM System **shall** [1877] recommend departure runway assignments that mitigate the capacity/demand imbalance.

### 3.1.8.3.5.2 Enable/Disable Load Balancing

#### 3.1.8.3.5.2.1 Enable Load Balancing {WP}

The TFDM System **shall** [1878] enable runway load balancing based on user input.

#### 3.1.8.3.5.2.2 Disable Load Balancing {WP}

The TFDM System **shall** [1879] disable runway load balancing based on user input.

#### 3.1.8.3.5.2.3 Display Load Balancing Status {WP}

The TFDM System **shall** [2018] display the enabled/disabled status of runway load balancing.

### 3.1.8.3.5.3 Maintain Load Balancing Parameters

#### 3.1.8.3.5.3.1 Store Load Balancing Parameters {WP}

The TFDM System **shall** [1880] store parameters for defining a runway capacity/demand imbalance.

#### 3.1.8.3.5.3.2 Display Load Balancing Parameters {WP}

The TFDM System **shall** [2019] display parameters for defining a runway capacity/demand imbalance.

#### 3.1.8.3.5.3.3 Modify Load Balancing Parameters {WP}

The TFDM System **shall** [1881] modify parameters defining a runway capacity/demand imbalance based on user input.

## 3.1.8.3.6 Integrate Wake Turbulence Mitigation for Departures into Runway Assignment (RN11-T1)

### 3.1.8.3.6.1 Enable WTMD {WP}

The TFDM System **shall** [1812] enable Wake Turbulence Mitigation for Departure (WTMD) procedures for a runway based on user input.

### 3.1.8.3.6.2 Disable WTMD {WP}

The TFDM System **shall** [1813] disable WTMD procedures for a runway based on user input.

### 3.1.8.3.6.3 Display WTMD States {WP}

The TFDM System **shall** [1814] display the following WTMD states for each runway:

- a. Unavailable
- b. Disabled
- c. Enabled

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## **3.1.8.3.6.4 Utilize WTMD States for Runway Assignment {WP}**

The TFDM System **shall** [1815] utilize each runway's WTMD state when generating a recommended runway for each departure flight.

## **3.1.8.4 Schedule and Sequence Flights**

### **3.1.8.4.1 Generate Runway Schedule (SS01-TC)**

#### **3.1.8.4.1.1 Generate Departure Schedule**

##### **3.1.8.4.1.1.1 Calculate TFDM Estimated Time of Departure (ETD) {Core}**

The TFDM System **shall** [783] calculate an ETD for each departure flight, based on:

- a. ERAM Proposed Departure Times
- b. TFMS ETDs
- c. ERAM EDCTs
- d. TBFM Controlled Departure Times
- e. User-Input TMIs
- f. User-Input Controlled Departure Times
- g. ASDE-X Surveillance Data
- h. Aircraft parking location
- i. The current and scheduled airport configuration
- j. Current and scheduled taxiway and runway closures
- k. Runway assignments
- l. Intersection/queue assignments
- m. Flight state data
- n. The arrival schedule
- o. Aircraft separation standards

#### **3.1.8.4.1.2 Generate Arrival Schedule**

##### **3.1.8.4.1.2.1 Predict Arrival Runway {Core}**

The TFDM System **shall** [788] predict an assigned runway for each arrival flight, based on:

- a. TBFM runway assignment
- b. Terminal Automation runway assignment
- c. ASDE-X surveillance data

##### **3.1.8.4.1.2.2 Calculate TFDM Estimated Time of Arrival (ETA) {Core}**

The TFDM System **shall** [789] calculate an ETA for each arrival flight, based on:

- a. ERAM ETAs
- b. TFMS ETAs
- c. TBFM Scheduled Time of Arrival (STAs)
- d. ASDE-X surveillance data
- e. TFDM-predicted arrival runway
- f. The current or scheduled airport configuration (see Sec. 3.1.8.1.1)
- g. The current or scheduled taxiway and runway state (see Sec. 3.1.8.5.2)
- h. Aircraft separation standards

#### **3.1.8.4.1.3 Display Runway Schedule**

##### **3.1.8.4.1.3.1 Display Runway Schedule {Core}**

The TFDM System **shall** [791] display the runway schedule.

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## 3.1.8.4.1.4 Estimate Runway Demand

### 3.1.8.4.1.4.1 Estimate Unconstrained Departure Demand {Core}

The TFDM System **shall** [1912] calculate an Unconstrained Time of Departure for each departure flight, based on:

- a. ERAM Proposed Departure Times
- b. TFMS ETDs
- c. ERAM EDCTs
- d. TBFM Controlled Departure Times
- e. User-Input TMIs
- f. User-Input Controlled Departure Times
- g. ASDE-X Surveillance Data
- h. Aircraft parking location
- i. The current and scheduled airport configuration
- j. Current and scheduled taxiway and runway closures
- k. Runway assignments
- l. Intersection/queue assignments
- m. Flight state data

### 3.1.8.4.1.4.2 Estimate Unconstrained Arrival Demand {Core}

The TFDM System **shall** [1913] calculate an Unconstrained Time of Arrival for each arrival flight, based on:

- a. ERAM ETAs
- b. TFMS ETAs
- c. TBFM STAs
- d. ASDE-X surveillance data
- e. TFDM-predicted arrival runway
- f. The current or scheduled airport configuration (see Sec. 3.1.8.1.1)
- g. The current or scheduled taxiway and runway state (see Sec. 3.1.8.5.2)

### 3.1.8.4.1.4.3 Display Demand {Core}

The TFDM System **shall** [1914] display runway demand.

## 3.1.8.4.2 Display Flight-Specific TFM-Constrained Times and Indicators (SS03-TC)

### 3.1.8.4.2.1 Display Controlled Times of Departure (CTDs)

#### 3.1.8.4.2.1.1 Display Flight-Specific CTDs {Core}

The TFDM System **shall** [792] display flight-specific controlled times of departure, including:

- a. ERAM EDCTs for GDPs, AFPs, or Ground Stops
- b. TBFM Controlled Times of Departure
- c. APREQ/CFR Controlled Times of Departure
- d. User-Input Controlled Times of Departure

#### 3.1.8.4.2.1.2 Notify CTD Approaching {Core}

The TFDM System **shall** [793] notify the user when the current time is approaching a flight's CTD.

#### 3.1.8.4.2.1.3 Notify CTD Past {Core}

The TFDM System **shall** [794] notify the user when the current time is past a flight's CTD.

#### 3.1.8.4.2.1.4 Set CTD Notification Thresholds {Core}

The TFDM System **shall** [1591] set CTD notification thresholds based on user input.

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## 3.1.8.4.2.2 Display Other TMIs

### 3.1.8.4.2.2.1 General {Core}

The TFDM System **shall** [795] display a flight-specific indication of the TMIs impacting a flight.

## 3.1.8.4.3 Generate Flight State Data (SS15-TC)

### 3.1.8.4.3.1 Assign Flight State {Core}

The TFDM System **shall** [1592] assign one of the following states to each flight, based on surveillance data, flight data, and user input:

- a. At gate
- b. Off block
- c. Taxiing (including destination; e.g., runway, gate, de-icing pad, maintenance hangar)
- d. In queue
- e. Departed
- f. Arriving

### 3.1.8.4.3.2 Update Flight State {Core}

The TFDM System **shall** [1593] update the state of each flight based on changes to surveillance data, flight data, and user input.

### 3.1.8.4.3.3 Display Flight State {Core}

The TFDM System **shall** [1631] display the state of each flight.

## 3.1.8.4.4 Process Flight-Specific Information from Flight Operators/Ramp Towers (SS11-T1)

### 3.1.8.4.4.1 Incorporate Flight Operator/Ramp Tower Data into Runway Schedule {WP}

The TFDM System **shall** [1600] utilize the following flight operator/ramp tower-provided information when generating the runway schedule:

- a. Parking location
- b. Off-block time (estimated, updated, and actual)
- c. Movement area entry time (estimated, updated, and actual)
- d. Departure time (estimated, updated, and actual)
- e. Flight priorities
- f. Flight preferences
- g. Gate conflicts
- h. Aircraft de-icing information

### 3.1.8.4.4.2 Display Flight Operator/Ramp Tower Data {WP}

The TFDM System **shall** [1632] display the following flight operator/ramp tower-provided information:

- a. Parking location
- b. Off-block time (estimated, updated, and actual)
- c. Movement area entry time (estimated, updated, and actual)
- d. Departure time (estimated, updated, and actual)
- e. Flight priorities
- f. Flight preferences
- g. Gate conflicts
- h. Aircraft de-icing information

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## 3.1.8.4.5 Generate Flight-Specific Surface Event Times (SS05-T1)

### 3.1.8.4.5.1 Calculate Movement Area Entry Time {WP}

For each departure flight, the TFDM System **shall** [1594] calculate a movement area entry time that meets the runway schedule.

### 3.1.8.4.5.2 Calculate Off-Block Time {WP}

For each departure flight, the TFDM System **shall** [1595] calculate an off-block time that meets the runway schedule.

### 3.1.8.4.5.3 Update Movement Area Entry Time {WP}

The TFDM System **shall** [1596] update movement area entry times based on runway schedule updates.

### 3.1.8.4.5.4 Update Off-Block Time {WP}

The TFDM System **shall** [1597] update off-block times based on runway schedule updates.

### 3.1.8.4.5.5 Display Movement Area Entry Time {WP}

The TFDM System **shall** [1598] display TFDM-calculated movement area entry times, visually distinguishing flights with a CTD.

### 3.1.8.4.5.6 Display Off-Block Time {WP}

The TFDM System **shall** [1599] display TFDM-calculated off-block times, visually distinguishing flights with a CTD.

## 3.1.8.4.6 Monitor Surface Schedule Compliance (SS13-T1)

### 3.1.8.4.6.1 Detect Non-Compliance for Flights with CTDs {WP}

For flights with CTDs, the TFDM System **shall** [1882] detect non-compliance with:

- a. TFDM-calculated off-block times
- b. TFDM-calculated movement area entry times
- c. CTDs

### 3.1.8.4.6.2 Predict Non-Compliance for Flights with CTDs {WP}

For flights with CTDs, the TFDM System **shall** [1883] predict non-compliance with:

- a. TFDM-calculated off-block times
- b. TFDM-calculated movement area entry times
- c. CTDs

### 3.1.8.4.6.3 Detect Non-Compliance for Flights with Controlled Movement Area Entry Times {WP}

For flights with controlled movement area entry times, the TFDM System **shall** [1884] detect non-compliance with:

- a. TFDM-calculated off-block times
- b. Controlled movement area entry times

### 3.1.8.4.6.4 Predict Non-Compliance for Flights with Controlled Movement Area Entry Times {WP}

For flights with controlled movement area entry times, the TFDM System **shall** [1885] predict non-compliance with:

- a. TFDM-calculated off-block times
- b. Controlled movement area entry times

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## 3.1.8.4.6.5 Notify Non-Compliance Detections {WP}

The TFDM System **shall** [1886] notify the user of flights that are detected to be non-compliant with:

- a. TFDM-calculated off-block times
- b. TFDM-calculated movement area entry times
- c. Controlled movement area entry times
- d. CTDs

## 3.1.8.4.6.6 Notify Non-Compliance Predictions {WP}

The TFDM System **shall** [1887] notify the user of flights that are predicted to be non-compliant with:

- a. TFDM-calculated off-block times
- b. TFDM-calculated movement area entry times
- c. Controlled movement area entry times
- d. CTDs

## 3.1.8.4.7 Process De-Icing Information and Surface Schedule Impacts (SS16-T1)

### 3.1.8.4.7.1 Utilize De-Icing Information {WP}

The TFDM System **shall** [1817] utilize the following aircraft-specific de-icing information when generating the surface schedule:

- a. Indication that aircraft requires de-icing
- b. De-icing location to be used
- c. De-icing actual start time
- d. De-icing actual end time
- e. Holdover time

### 3.1.8.4.7.2 Store De-Icing Parameters {WP}

The TFDM System **shall** [1818] store airport de-icing parameters, including:

- a. De-icing locations
- b. De-icing location capacities
- c. Estimated de-icing durations

### 3.1.8.4.7.3 Display De-Icing Parameters {WP}

The TFDM System **shall** [2020] display airport de-icing parameters.

### 3.1.8.4.7.4 Modify De-Icing Parameters {WP}

The TFDM System **shall** [1819] modify airport de-icing parameters based on user input.

## 3.1.8.4.8 Manage Departure Queue Collaboratively with Flight Operators (SS17-T1)

### 3.1.8.4.8.1 Create Program {WP}

The TFDM System **shall** [1888] create departure queue management programs based on user input of:

- a. Program start time
- b. Program end time
- c. Metering categories
- d. Desired number of departures entering movement area for each time interval and metering category

### 3.1.8.4.8.2 Allocate Flight Counts {WP}

When a departure queue management program is created, the TFDM System **shall** [1889] allocate the number of departure flights that can enter the movement area for each flight operator, within a metering category and time interval.

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## **3.1.8.4.8.3 Update Allocations {WP}**

The TFDM System **shall** [1890] update movement area entry allocations based on changes to:

- a. Flight data
- b. Departure queue management program parameters

## **3.1.8.4.8.4 Revise Program {WP}**

The TFDM System **shall** [1891] revise departure queue management programs based on user input of changes to program parameters.

## **3.1.8.4.8.5 Cancel Program {WP}**

The TFDM System **shall** [1892] cancel departure queue management programs based on user input.

## **3.1.8.4.8.6 Display Program {WP}**

The TFDM System **shall** [1894] display created departure queue management programs, including program parameters and allocations.

## **3.1.8.4.8.7 Monitor Compliance {WP}**

The TFDM System **shall** [1893] monitor flight operator compliance with movement area entry allocations.

## **3.1.8.4.9 Manage the Surface Departure Schedule Collaboratively with Flight Operators (SS18-T1)**

### **3.1.8.4.9.1 Create Program {WP}**

The TFDM System **shall** [1895] create departure schedule management programs based on user input of:

- a. Program start time
- b. Program end time
- c. Metering categories
- d. Desired number of departures entering movement area for each time interval and metering category

### **3.1.8.4.9.2 Assign Times {WP}**

When a departure schedule management program is created, the TFDM System **shall** [1896] assign flight-specific controlled movement area entry times to departure flights.

### **3.1.8.4.9.3 Update Times {WP}**

The TFDM System **shall** [1897] update flight-specific controlled movement area entry times based on:

- a. Flight data changes
- b. Departure schedule management program parameter changes
- c. Flight operator provided time swaps between flights in the same metering category

### **3.1.8.4.9.4 Revise Program {WP}**

The TFDM System **shall** [1898] revise departure schedule management programs based on user input of changes to program parameters.

### **3.1.8.4.9.5 Cancel Program {WP}**

The TFDM System **shall** [1899] cancel departure schedule management programs based on user input.

### **3.1.8.4.9.6 Display Program {WP}**

The TFDM System **shall** [1900] display created departure schedule management programs, including program parameters and assigned times.

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## 3.1.8.4.10 Analyze Alternatives for Surface Management (SS24-T1)

### 3.1.8.4.10.1 Analyze Current and Predicted Surface Situation

#### 3.1.8.4.10.1.1 Predict Surface Problem {WP}

The TFDM System **shall** [1904] predict when demand will exceed the capacity of surface resources.

#### 3.1.8.4.10.1.2 Notify Surface Problem {WP}

The TFDM System **shall** [1905] notify the user of predicted surface capacity/demand problems.

### 3.1.8.4.10.2 Maintain Notification Parameters

#### 3.1.8.4.10.2.1 Store Notification Parameters {WP}

The TFDM System **shall** [1906] store parameters for notification of surface capacity/demand problems.

#### 3.1.8.4.10.2.2 Display Notification Parameters {WP}

The TFDM System **shall** [2021] display parameters for notification of surface capacity/demand problems.

#### 3.1.8.4.10.2.3 Modify Notification Parameters {WP}

The TFDM System **shall** [1907] modify parameters for notification of surface capacity/demand problems based on user input.

### 3.1.8.4.10.3 Analyze What-If Scenarios

#### 3.1.8.4.10.3.1 Predict What-If Scenario Impact {WP}

The TFDM System **shall** [1908] predict the impacts of applying the following surface management techniques, both alone and in combination, based on user input:

- a. Airport configuration change
- b. Runway assignment rule change
- c. Runway load balancing
- d. Departure queue management program
- e. Departure schedule management program
- f. Departure sequence adjustments

#### 3.1.8.4.10.3.2 Display What-If Scenario Impact {WP}

The TFDM System **shall** [1909] display the predicted impacts of applying the following surface management techniques, both alone and in combination, based on user input:

- a. Airport configuration change
- b. Runway assignment rule change
- c. Runway load balancing
- d. Departure queue management program
- e. Departure schedule management program
- f. Departure sequence adjustments

### 3.1.8.4.10.4 Maintain Surface Management Parameters

#### 3.1.8.4.10.4.1 Store Surface Management Parameters {WP}

The TFDM System **shall** [1910] store parameters for surface management techniques.

#### 3.1.8.4.10.4.2 Modify Surface Management Parameters {WP}

The TFDM System **shall** [1911] modify parameters for surface management techniques based on user input.



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## **3.1.8.4.10.4.3 Display Surface Management Parameters {WP}**

The TFDM System **shall** [2022] display parameters for surface management techniques.

## **3.1.8.4.11 Recommend Departure Runway Sequence (SS02-T1)**

### **3.1.8.4.11.1 Recommend Departure Sequence {WP}**

The TFDM System **shall** [1902] recommend departure sequence adjustments that increase runway throughput and reduce flight delay.

### **3.1.8.4.11.2 Display Recommended Sequence {WP}**

The TFDM System **shall** [1903] display departure sequence recommendations.

## **3.1.8.4.12 Integrate Wake Turbulence Mitigation for Departures into the Surface Schedule (SS22-T1)**

### **3.1.8.4.12.1 Utilize WTMD States in Runway Schedule {WP}**

The TFDM System **shall** [1820] utilize each runway's WTMD state when generating the runway schedule.

## **3.1.8.5 Manage Taxi Routing**

### **3.1.8.5.1 Provide Queue Location and/or Intersection Departure (TX01-TC)**

#### **3.1.8.5.1.1 Assign Queue Location / Intersection Departure**

##### **3.1.8.5.1.1.1 Assign Queue / Intersection {Core}**

The TFDM System **shall** [796] assign departure queues / intersection departures based on user input.

##### **3.1.8.5.1.1.2 Modify Queue / Intersection {Core}**

The TFDM System **shall** [799] modify departure queue / intersection departure assignments based on user input.

##### **3.1.8.5.1.1.3 Notify Non-Applicable Queue / Intersection {Core}**

The TFDM System **shall** [797] notify the user that a flight's assigned departure queue / intersection departure is not applicable to its assigned departure runway, the airport configuration, or any usage restrictions.

##### **3.1.8.5.1.1.4 Display Queue / Intersection {Core}**

The TFDM System **shall** [798] display the identifier of the assigned runway queue / intersection departure for each applicable flight.

#### **3.1.8.5.1.2 Maintain List of Queue and Intersection Departure Locations**

##### **3.1.8.5.1.2.1 Store Queue / Intersection List {Core}**

The TFDM System **shall** [800] store a list of departure queue identifiers and intersection departure locations for each airport configuration and runway, including any usage restrictions.

##### **3.1.8.5.1.2.2 Add Queue / Intersection {Core}**

The TFDM System **shall** [801] add new queue / intersection identifiers based on user input.

##### **3.1.8.5.1.2.3 Modify Queue / Intersection {Core}**

The TFDM System **shall** [802] modify queue / intersection identifiers based on user input.

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## **3.1.8.5.1.2.4 Delete Queue / Intersection {Core}**

The TFDM System **shall** [803] delete queue / intersection identifiers based on user input.

## **3.1.8.5.2 Manage and Display Real-Time State of Runways and Taxiways (TX10-TC)**

### **3.1.8.5.2.1 Open/Close Taxiway or Taxiway Segment**

#### **3.1.8.5.2.1.1 Open Taxiway {Core}**

The TFDM System **shall** [804] open a taxiway or taxiway segment based on user input.

#### **3.1.8.5.2.1.2 Close Taxiway {Core}**

The TFDM System **shall** [805] close a taxiway or taxiway segment based on user input of:

- a. Closed taxiway or taxiway segment
- b. Reason for closure
- c. Expected re-opening time

### **3.1.8.5.2.2 Open/Close Runway or Runway Segment**

#### **3.1.8.5.2.2.1 Open Runway {Core}**

The TFDM System **shall** [806] open a runway or runway segment based on user input.

#### **3.1.8.5.2.2.2 Close Runway {Core}**

The TFDM System **shall** [807] close a runway or runway segment based on user input of:

- a. Closed runway or runway segment
- b. Reason for closure
- c. Expected re-opening time

### **3.1.8.5.2.3 Schedule Taxiway or Taxiway Segment Closure**

#### **3.1.8.5.2.3.1 Schedule Taxiway Closure {Core}**

The TFDM System **shall** [808] schedule a taxiway or taxiway segment closure based on user input of:

- a. Closed taxiway or taxiway segment
- b. Scheduled closing time
- c. Scheduled re-opening time
- d. Reason for closure

#### **3.1.8.5.2.3.2 Cancel Scheduled Taxiway Closure {Core}**

The TFDM System **shall** [809] cancel a scheduled taxiway or taxiway segment closure based on user input.

### **3.1.8.5.2.4 Schedule Runway or Runway Segment Closure**

#### **3.1.8.5.2.4.1 Schedule Runway Closure {Core}**

The TFDM System **shall** [810] schedule a runway or runway segment closure based on user input of:

- a. Closed runway or runway segment
- b. Scheduled closing time
- c. Scheduled re-opening time
- d. Reason for closure

#### **3.1.8.5.2.4.2 Cancel Scheduled Runway Closure {Core}**

The TFDM System **shall** [811] cancel a scheduled runway or runway segment closure based on user input.

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## 3.1.8.5.2.5 Display State of Runways and Taxiways

### 3.1.8.5.2.5.1 Display Current Taxiway / Runway Status {Core}

The TFDM System **shall** [812] display the current open/close status of taxiways, taxiway segments, runways, and runway segments, including the reasons for closure and expected re-opening times.

### 3.1.8.5.2.5.2 Display Scheduled Taxiway / Runway Status {Core}

The TFDM System **shall** [813] display the scheduled open/close status of taxiways, taxiway segments, runways, and runway segments, including the reasons for closure and scheduled closing and opening times.

## 3.1.8.5.2.6 Maintain Airport Runway and Taxiway Topology

### 3.1.8.5.2.6.1 Store Topology {Core}

The TFDM System **shall** [814] store the airport runway and taxiway network topology.

### 3.1.8.5.2.6.2 Display Topology {Core}

The TFDM System **shall** [2023] display the airport runway and taxiway network topology.

### 3.1.8.5.2.6.3 Modify Topology {Core}

The TFDM System **shall** [815] modify the airport runway and taxiway network topology based on user input.

## 3.1.8.5.3 Manually Assign Pre-Defined Taxi Route to a Flight (TX01-T2)

### 3.1.8.5.3.1 Assign Pre-Defined Taxi Route

#### 3.1.8.5.3.1.1 Display Pre-Defined Taxi Routes {WP}

The TFDM System **shall** [1607] display the set of pre-defined taxi routes applicable to a flight based on:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination
- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

#### 3.1.8.5.3.1.2 Assign Taxi Route {WP}

The TFDM System **shall** [1608] assign a pre-defined taxi route, including hold short points, to a flight based on user input.

#### 3.1.8.5.3.1.3 Modify Taxi Route {WP}

The TFDM System **shall** [1609] modify a pre-defined taxi route assignment based on user input.

#### 3.1.8.5.3.1.4 Display Assigned Taxi Route {WP}

The TFDM System **shall** [1610] display the assigned pre-defined taxi route.

#### 3.1.8.5.3.1.5 Notify Pre-Defined Taxi Route Infeasible {WP}

The TFDM System **shall** [1611] notify the user if the assigned pre-defined taxi route is no longer feasible due to changes in:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination

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- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

## **3.1.8.5.3.2 Maintain Set of Pre-Defined Taxi Routes**

### **3.1.8.5.3.2.1 Store Set of Pre-Defined Taxi Routes {WP}**

The TFDM System **shall** [1601] store the set of pre-defined taxi routes, including hold short points.

### **3.1.8.5.3.2.2 Display Set of Pre-Defined Taxi Routes {WP}**

The TFDM System **shall** [2024] display the set of pre-defined taxi routes, including hold short points.

### **3.1.8.5.3.2.3 Add Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1602] add new pre-defined taxi routes based on user input.

### **3.1.8.5.3.2.4 Delete Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1603] delete pre-defined taxi routes based on user input.

### **3.1.8.5.3.2.5 Modify Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1604] modify pre-defined taxi routes based on user input.

### **3.1.8.5.3.2.6 Enable Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1605] enable pre-defined taxi routes for use based on user input.

### **3.1.8.5.3.2.7 Disable Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1606] disable pre-defined taxi routes for use based on user input.

## **3.1.8.5.4 Manually Enter and Assign Ad-Hoc Taxi Route to a Flight (TX02-T2)**

### **3.1.8.5.4.1 Enter and Assign Ad-Hoc Taxi Route**

#### **3.1.8.5.4.1.1 Create Ad-Hoc Taxi Route {WP}**

The TFDM System **shall** [1616] create ad-hoc taxi routes based on user input.

#### **3.1.8.5.4.1.2 Assist Taxi Route Entry {WP}**

The TFDM System **shall** [1617] display possible route completions for partially-created ad-hoc taxi routes.

#### **3.1.8.5.4.1.3 Validate Created Ad-Hoc Taxi Route {WP}**

The TFDM System **shall** [1618] validate a created ad-hoc taxi route based on:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination
- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

#### **3.1.8.5.4.1.4 Notify Ad-Hoc Taxi Route Invalid {WP}**

The TFDM System **shall** [2026] notify the user that a created ad-hoc taxi route is invalid.

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## **3.1.8.5.4.1.5 Assign Ad-Hoc Taxi Route {WP}**

The TFDM System **shall** [2025] assign validated ad-hoc taxi routes to flights based on user input.

## **3.1.8.5.4.1.6 Display Assigned Ad-Hoc Taxi Route {WP}**

The TFDM System **shall** [1633] display the assigned ad-hoc taxi route.

## **3.1.8.5.4.1.7 Notify Ad-Hoc Taxi Route Infeasible {WP}**

The TFDM System **shall** [1619] notify the user if the assigned ad-hoc taxi route is no longer feasible due to changes in:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination
- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

## **3.1.8.5.4.2 Maintain Taxiway Usage Rules**

### **3.1.8.5.4.2.1 Store Taxiway Usage Rules {WP}**

The TFDM System **shall** [1612] store the set of taxiway usage rules (e.g., directionality, allowed aircraft types, restrictions based on weather minima).

### **3.1.8.5.4.2.2 Display Taxiway Usage Rules {WP}**

The TFDM System **shall** [2027] display the set of taxiway usage rules.

### **3.1.8.5.4.2.3 Add Taxiway Usage Rule {WP}**

The TFDM System **shall** [1613] add taxiway usage rules based on user input.

### **3.1.8.5.4.2.4 Delete Taxiway Usage Rule {WP}**

The TFDM System **shall** [1614] delete taxiway usage rules based on user input.

### **3.1.8.5.4.2.5 Modify Taxiway Usage Rule {WP}**

The TFDM System **shall** [1615] modify taxiway usage rules based on user input.

## **3.1.8.5.5 Recommend Pre-Defined Two-Dimensional Taxi Route (TX03-T2)**

### **3.1.8.5.5.1 Recommend Pre-Defined Taxi Route {WP}**

The TFDM System **shall** [1620] recommend a pre-defined taxi route (including any required hold-short instructions) for each flight.

### **3.1.8.5.5.2 Update Taxi Route Recommendation {WP}**

The TFDM System **shall** [1621] update the recommended pre-defined taxi route based on changes to:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination
- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

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## **3.1.8.5.5.3 Display Recommended Taxi Route {WP}**

The TFDM System **shall** [1622] display the recommended pre-defined taxi route.

## **3.1.8.5.5.4 Assign Recommended Taxi Route {WP}**

The TFDM System **shall** [2028] assign the recommended pre-defined taxi route to a flight based on user input.

## **3.1.8.5.6 Recommend Non-Standard Two-Dimensional Taxi Route (TX04-T2)**

### **3.1.8.5.6.1 Create Recommended Ad-Hoc Taxi Route {WP}**

The TFDM System **shall** [1623] create a recommended ad-hoc taxi route (including any required hold-short instructions) for each flight.

### **3.1.8.5.6.2 Update Taxi Route Recommendation {WP}**

The TFDM System **shall** [1624] update the recommended ad-hoc taxi route based on changes to:

- a. Flight data
- b. Aircraft location
- c. Aircraft surface destination
- d. Runway schedule
- e. Airport configuration schedule
- f. Runway and taxiway closures
- g. Taxiway usage rules

### **3.1.8.5.6.3 Display Recommended Taxi Route {WP}**

The TFDM System **shall** [1625] display the recommended ad-hoc taxi route.

### **3.1.8.5.6.4 Assign Recommended Taxi Route {WP}**

The TFDM System **shall** [2029] assign the recommended ad-hoc taxi route to a flight based on user input.

## **3.1.8.5.7 Monitor Conformance to Two-Dimensional Taxi Route (TX11-T2)**

### **3.1.8.5.7.1 Detect Taxi Route Nonconformance {WP}**

The TFDM System **shall** [1626] detect aircraft nonconformance with the assigned taxi route based on surveillance data.

### **3.1.8.5.7.2 Determine Nonconformance Severity {WP}**

The TFDM System **shall** [1627] determine the severity of a taxi route nonconformance.

### **3.1.8.5.7.3 Notify Nonconformance {WP}**

The TFDM System **shall** [1628] notify the user of a taxi route nonconformance, distinguishing among severity levels.

## **3.1.8.5.8 Monitor Aircraft Compliance with Control Instructions (TX12-T2)**

### **3.1.8.5.8.1 Detect Control Instruction Noncompliance {WP}**

The TFDM System **shall** [1629] detect aircraft noncompliance with the following control instructions, based on surveillance data, weather minima, and user input:

- a. Cleared to taxi
- b. Hold short
- c. Line up and wait
- d. Cleared for takeoff

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## 3.1.8.5.8.2 Notify Control Instruction Noncompliance {WP}

The TFDM System **shall** [1630] notify the user of an aircraft control instruction noncompliance.

## 3.1.9 Terminal SWIM (TSWIM) Services

### 3.1.9.1 TSWIM General Requirements

#### 3.1.9.1.1 Be SWIM Compatible {Core}

The TFDM System **shall** [1735] be compatible with SWIM to use SWIM messaging.

#### 3.1.9.1.2 Be SWIM Compliant {Core}

The TFDM System **shall** [1736] be compliant with SWIM to use SWIM messaging.

### 3.1.9.2 Process SWIM Messages

#### 3.1.9.2.1 Preserve Message Order {Core}

The TFDM System **shall** [1097] distribute messages to the subscriber in the order received from the data source.

#### 3.1.9.2.2 Determine Destination {Core}

The TFDM System **shall** [1102] determine the destination for incoming messages.

### 3.1.9.3 Route SWIM Messages

#### 3.1.9.3.1 Support Rule-Based Routing {Core}

The TFDM System **shall** [1737] support rule-based routing for incoming messages.

#### 3.1.9.3.2 Route Messages from SWIM {Core}

The TFDM System **shall** [1105] route external messages received from SWIM to internal TFDM destinations.

#### 3.1.9.3.3 Route Messages to SWIM {Core}

The TFDM System **shall** [1106] route messages to SWIM.

### 3.1.9.4 Transform TFDM Data

#### 3.1.9.4.1 Transform ASDE-X Output Data

##### 3.1.9.4.1.1 Derive ASDE-X SPOT OUT Report {Core}

When an ASDE-X System Track Message (CAT11) is received for an aircraft with a discrete beacon code, the TFDM System **shall** [1107] determine whether a SPOT OUT surface movement event has occurred.

##### 3.1.9.4.1.2 Derive ASDE-X OFF Report {Core}

When an ASDE-X System Track Message (CAT11) is received for an aircraft with a discrete beacon code, the TFDM System **shall** [1108] determine whether an OFF surface movement event has occurred.

##### 3.1.9.4.1.3 Derive ASDE-X ON Report {Core}

When an ASDE-X System Track Message (CAT11) is received for an aircraft with a discrete beacon code, the TFDM System **shall** [1109] determine whether an ON surface movement event has occurred.

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## **3.1.9.4.1.4 Derive ASDE-X SPOT IN Report {Core}**

When an ASDE-X System Track Message (CAT11) is received for an aircraft with a discrete beacon code, the TFDM System **shall** [1110] determine whether a SPOT IN surface movement event has occurred.

## **3.1.9.4.1.5 Discard ASDE-X Reports in Maintenance Mode {Core}**

When an ASDE-X System Status message is received indicating that ASDE-X is in maintenance mode, the TFDM System **shall** [1111] discard all surveillance messages until a subsequent status message is received indicating that ASDE-X is no longer in maintenance mode.

## **3.1.9.5 Publish TFDM Data**

### **3.1.9.5.1 Support SWIM Publish Requirements**

#### **3.1.9.5.1.1 Support SWIM Publish {Core}**

The TFDM System **shall** [1738] publish data using the SWIM publish-subscribe message exchange pattern.

#### **3.1.9.5.1.2 Use Data Publication Format Standards {Core}**

The TFDM System **shall** [1112] provide Extensible Markup Language (XML) data using Java Messaging Service (JMS) for data publications.

#### **3.1.9.5.1.3 Send Current TSWIM Service Status {Core}**

The TFDM System **shall** [1113] send the current TSWIM service status to each active NAS subscriber on a fixed period as specified in the associated NAS Subscriber Interface Requirements Document (IRD).

### **3.1.9.5.2 Publish RVR Data**

#### **3.1.9.5.2.1 Publish RVR Data {Core}**

The TFDM System **shall** [1117] publish RVR data to subscribers.

### **3.1.9.5.3 Publish Surveillance Data**

#### **3.1.9.5.3.1 Publish ASDE-X Position Report and Time {Core}**

When an ASDE-X System Track Message (CAT11) is received for an aircraft with a discrete or non-discrete beacon code, the TFDM System **shall** [1118] publish the aircraft position and report time to subscribers.

#### **3.1.9.5.3.2 Publish ASDE-X Surface Movement Events (SME) {Core}**

When a surface movement event is generated, the TFDM System **shall** [1119] publish the event and time to subscribers.

#### **3.1.9.5.3.3 Publish ASDE-X Status and Time {Core}**

When an ASDE-X System Status Message is received, the TFDM System **shall** [1120] publish the ASDE-X Status and Time to subscribers.

#### **3.1.9.5.3.4 Publish ASSC Data {Core}**

The TFDM System **shall** [1938] publish ASSC data to subscribers.

#### **3.1.9.5.3.5 Publish LCGS Data {Core}**

The TFDM System **shall** [1939] publish LCGS data to subscribers.



# MARKET SURVEY

## **3.1.9.5.4 Publish Data to ERAM**

### **3.1.9.5.4.1 Publish to ERAM {Core}**

The TFDM System shall [1121] publish flight data to ERAM.

## **3.1.9.5.5 Publish Data to TFMS**

### **3.1.9.5.5.1 Publish to TFMS {Core}**

The TFDM System shall [1122] publish data to TFMS.

## **3.1.9.5.6 Publish Data to TBFM**

### **3.1.9.5.6.1 Publish to TBFM {Core}**

The TFDM System shall [1739] publish data to TBFM.

## **3.1.9.5.7 Publish Data to Federal NOTAM System (FNS)**

### **3.1.9.5.7.1 Publish to FNS {Core}**

The TFDM System shall [1740] publish data to FNS.

## **3.1.9.5.8 Publish Data to Aeronautical Common Services (ACS)**

### **3.1.9.5.8.1 Publish to ACS {Core}**

The TFDM System shall [1741] publish aeronautical data to ACS.

## **3.1.9.5.9 Publish Data to Remote Monitoring and Logging System (RMLS)**

### **3.1.9.5.9.1 Publish to RMLS {Core}**

The TFDM System shall [1124] publish system events to RMLS.

## **3.1.9.5.10 Publish Data to Flight Operations Center (FOCs)**

### **3.1.9.5.10.1 Publish to FOCs {WP}**

The TFDM System shall [1943] publish data to FOCs.

## **3.1.9.5.11 Publish Data to Data Link Service Providers (DLSPs)**

### **3.1.9.5.11.1 Publish to DLSPs {WP}**

The TFDM System shall [1944] publish data to DLSPs.

## **3.1.9.5.12 Publish Data to Ramp Towers**

### **3.1.9.5.12.1 Publish to Ramp Towers {WP}**

The TFDM System shall [1945] publish data to Ramp Towers.

## **3.1.9.5.13 Publish Data to Airport Authorities**

### **3.1.9.5.13.1 Publish to Airport Authorities {WP}**

The TFDM System shall [1946] publish data to Airport Authorities.

# MARKET SURVEY

## 3.1.9.6 Subscribe to SWIM Data

### 3.1.9.6.1 Support SWIM Subscribe Requirements

#### 3.1.9.6.1.1 Support SWIM Subscribe {Core}

The TFDM System shall [1125] subscribe to data using the SWIM publish-subscribe message exchange pattern.

### 3.1.9.6.2 Subscribe to ERAM Data

#### 3.1.9.6.2.1 Subscribe to ERAM Data {Core}

The TFDM System shall [1130] subscribe to ERAM data.

### 3.1.9.6.3 Subscribe to TFMS Data

#### 3.1.9.6.3.1 Subscribe to TFMS Data {Core}

The TFDM System shall [1131] subscribe to TFMS data.

### 3.1.9.6.4 Subscribe to TBFM Data

#### 3.1.9.6.4.1 Subscribe to TBFM Data {Core}

The TFDM System shall [1742] subscribe to TBFM data.

### 3.1.9.6.5 Subscribe to Weather Products

#### 3.1.9.6.5.1 Subscribe to RVR Data {Core}

The TFDM System shall [1116] subscribe to RVR data.

#### 3.1.9.6.5.2 Subscribe to ITWS Data {Core}

The TFDM System shall [1378] subscribe to ITWS data.

#### 3.1.9.6.5.3 Subscribe to CIWS Data {Core}

The TFDM System shall [1379] subscribe to CIWS data.

#### 3.1.9.6.5.4 Subscribe to Surface Observing Capability (SOC) Data {Core}

The TFDM System shall [1940] subscribe to SOC data.

#### 3.1.9.6.5.5 Subscribe to NextGen Network Enabled (NNEW) Data {Core}

The TFDM System shall [1941] subscribe to NNEW data.

#### 3.1.9.6.5.6 Subscribe to NextGen Weather Processor (NWP) Data {Core}

The TFDM System shall [2081] subscribe to NWP data.

#### 3.1.9.6.5.7 Subscribe to NextGen Wind Shear Detection Services (WSDS) Data {WP}

The TFDM System shall [2082] subscribe to WSDS data.

### 3.1.9.6.6 Subscribe to FNS Data

#### 3.1.9.6.6.1 Subscribe to FNS Data {Core}

The TFDM System shall [1743] subscribe to FNS data.

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## **3.1.9.6.7    Subscribe to ACS Data**

### **3.1.9.6.7.1    Subscribe to ACS Data {Core}**

The TFDM System **shall** [1744] subscribe to ACS data.

## **3.1.9.6.8    Subscribe to Airport Geographical Information System (AGIS) Data**

### **3.1.9.6.8.1    Subscribe to AGIS Data {Core}**

The TFDM System **shall** [1134] subscribe to AGIS data.

## **3.1.9.6.9    Subscribe to RMLS Data**

### **3.1.9.6.9.1    Subscribe to RMLS System Event Data {Core}**

The TFDM System **shall** [1135] subscribe to non-local RMLS system event data.

## **3.1.9.6.10    Subscribe to FOC Data**

### **3.1.9.6.10.1    Subscribe to FOC Data {WP}**

The TFDM System **shall** [1947] subscribe to FOC data.

## **3.1.9.6.11    Subscribe to DLSP Data**

### **3.1.9.6.11.1    Subscribe to DLSP Data {WP}**

The TFDM System **shall** [1948] subscribe to DLSP data.

## **3.1.9.6.12    Subscribe to Ramp Tower Data**

### **3.1.9.6.12.1    Subscribe to Ramp Tower Data {WP}**

The TFDM System **shall** [1949] subscribe to Ramp Tower data.

## **3.1.9.6.13    Subscribe to Airport Authority Data**

### **3.1.9.6.13.1    Subscribe to Airport Authority Data {WP}**

The TFDM System **shall** [1942] subscribe to Airport Authority data.

## **3.1.9.7    Request SWIM Data**

### **3.1.9.7.1    Support SWIM Requests {Core}**

The TFDM System **shall** [1136] allow requests using the SWIM request-response message exchange pattern.

## **3.1.9.8    Reply with SWIM Data**

### **3.1.9.8.1    Support SWIM Responses {Core}**

The TFDM System **shall** [1137] allow responses using the SWIM request-response message exchange pattern.

## **3.1.9.9    Reconstitute Subscribers**

### **3.1.9.9.1    Retain Published Data {Core}**

The TFDM System **shall** [1140] retain published SWIM data in persistent storage so that it may be transmitted when requested.

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## **3.1.9.9.2 Reconstitute Subscriber {Core}**

The TFDM System **shall** [2073] reconstitute subscribers with published SWIM data based on external user requests.

## **3.1.10 User Interface Services (UIS)**

### **3.1.10.1 User Data Input**

#### **3.1.10.1.1 Accept Data {Core}**

The TFDM System **shall** [50] accept data input from users.

#### **3.1.10.1.2 Accept Acknowledge Messages {Core}**

The TFDM System **shall** [269] accept user input to acknowledge messages.

#### **3.1.10.1.3 Validate Data Entries {Core}**

The TFDM System **shall** [289] validate user data entries.

#### **3.1.10.1.4 Notify of Invalid Data Entries {Core}**

The TFDM System **shall** [290] notify users of invalid data entries.

#### **3.1.10.1.5 Generate Error Feedback {Core}**

The TFDM System **shall** [291] generate feedback to the user on invalid data entries.

#### **3.1.10.1.6 Display Error Feedback {Core}**

The TFDM System **shall** [1924] display feedback to the user on invalid data entries.

#### **3.1.10.1.7 Update Times {Core}**

The TFDM System **shall** [1554] update time based on user input.

#### **3.1.10.1.8 Make Electronic Copies {Core}**

The TFDM System **shall** [1928] make electronic copies of the display screen based on user input.

### **3.1.10.2 Notifications**

#### **3.1.10.2.1 Generate Alarms, Alerts, and Prompts {Core}**

The TFDM System **shall** [40] generate:

- a. Visual alerts
- b. Simultaneous aural alarms and visual alerts
- c. Visual prompts

#### **3.1.10.2.2 Alarms, Alerts, and Prompts {Core}**

The TFDM System **shall** [1925] display:

- a. Visual Alerts
- b. Simultaneous Aural Alarms and Visual Alerts
- c. Visual Prompts

#### **3.1.10.2.3 Suppress Notifications {Core}**

The TFDM System **shall** [41] allow users to suppress alarms, alerts, and prompts.

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## 3.1.10.2.4 Alarms, Alerts, Prompts ON/OFF Selection

### 3.1.10.2.4.1 Notification ON Selection {Core}

The TFDM System shall [42] turn on selected alarms, alerts, and prompts based on authorized user input.

### 3.1.10.2.4.2 Notification OFF Selection {Core}

The TFDM System shall [43] turn off selected alarms, alerts, and prompts based on authorized user input.

## 3.1.10.3 Tower User-System Interaction

### 3.1.10.3.1 Position Configuration Commands

#### 3.1.10.3.2 Accept Tower User Position Configuration Plans {Core}

The TFDM System shall [270] accept position configuration plans based on user input.

##### 3.1.10.3.2.1 Activate Tower Configuration Plans {Core}

The TFDM System shall [325] activate position configuration plans based on user input.

##### 3.1.10.3.2.2 Modify Configuration Plans {Core}

The TFDM System shall [326] modify position configuration plans based on user input.

##### 3.1.10.3.2.3 Store Tower Position Configuration Plans {Core}

The TFDM System shall [48] store position configuration plans based on user input.

### 3.1.10.3.3 Preference Sets

#### 3.1.10.3.3.1 Define Preference Sets {Core}

The TFDM System shall [1308] define a user's preference set based on that user's input.

#### 3.1.10.3.3.2 Modify Preference Sets {Core}

The TFDM System shall [1309] modify a user's preference set based on that user's input.

#### 3.1.10.3.3.3 Apply Tower Users' Display Preference Sets {Core}

The TFDM System shall [46] apply the specific user's preference set upon that user's input.

#### 3.1.10.3.3.4 Store Users' Preference Sets {Core}

The TFDM System shall [45] store the preference sets for each user.

#### 3.1.10.3.3.5 Configure Tower Users' Display Based on Preference Set {Core}

The TFDM System shall [44] configure the display based on a specific user's preference set selection.

## 3.1.10.4 Display Windows

### 3.1.10.4.1 Window Independence

#### 3.1.10.4.1.1 Allow Independent Windows {Core}

The TFDM System shall [985] allow each window to function as an independent display based on user input.

#### 3.1.10.4.1.2 Display Independence {Core}

The TFDM System shall [986] allow each window to be independently controlled based on user input.

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## **3.1.10.4.1.3 Independent Window Presentation {Core}**

The TFDM System **shall** [990] enable independent window presentation control with independent window movement.

## **3.1.10.4.1.4 Window Cross Functionality {Core}**

The TFDM System **shall** [987] provide the same functionality of the primary window to all display windows.

## **3.1.10.4.2 Window Display {Core}**

The TFDM System **shall** [581] change selected window displays based on user input.

## **3.1.10.4.3 Window Range Scaling {Core}**

The TFDM System **shall** [992] allow independent range scaling of selected window presentations based on user input.

## **3.1.10.5 Display Characteristics**

### **3.1.10.5.1 Color Displays {Core}**

The TFDM System **shall** [995] utilize color displays for ATCT positions.

### **3.1.10.5.2 Ambient Lighting Readability {Core}**

The TFDM System displays **shall** [996] be readable in ATCT cab ambient light conditions.

### **3.1.10.5.3 Contrast Controls {Core}**

The TFDM System displays **shall** [997] have contrast controls accessible to the user.

### **3.1.10.5.4 Brightness Controls {Core}**

The TFDM System displays **shall** [998] have brightness controls accessible to the user.

### **3.1.10.5.5 Glare-Free Displays {Core}**

The TFDM System displays **shall** [999] be free of reflection and glare.

### **3.1.10.5.6 Display Tilt {Core}**

The TFDM System displays **shall** [1001] have horizontal and vertical tilt capability.

## **3.1.10.6 User Input Devices and Controls**

### **3.1.10.6.1 User Input Devices {Core}**

The TFDM System **shall** [1926] have user input devices.

### **3.1.10.6.2 Message Waiting Indication {Core}**

The TFDM System **shall** [1019] display an indication of a message waiting.

### **3.1.10.6.3 Selectable Display Formats {Core}**

The TFDM System **shall** [1396] provide adaptable display formats for:

- a. Date
- b. Time
- c. Altimeter
- d. ATIS Code

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## 3.1.10.7 Configure Positions

### 3.1.10.7.1 Consolidate Position {Core}

The TFDM System **shall** [322] consolidate user positions based on user input.

### 3.1.10.7.2 Deconsolidate Position {Core}

The TFDM System **shall** [323] deconsolidate user positions based on user input.

### 3.1.10.7.3 Reassign Position {Core}

The TFDM System **shall** [324] reassign user positions based on user input.

### 3.1.10.7.4 Open Position {Core}

The TFDM System **shall** [320] open user positions based on user input.

### 3.1.10.7.5 Close Position {Core}

The TFDM System **shall** [321] close user positions based on user input.

### 3.1.10.7.6 Transfer Flights Before Closing Position {Core}

The TFDM System user position **shall** [578] remain open until all flight data under its ownership has been transferred.

## 3.1.10.8 Display Data

### 3.1.10.8.1 Display Types of Data {Core}

The TFDM System **shall** [1927] display the following data:

- a. Date
- b. Time
- c. Altimeter
- d. ATIS Code

## 3.1.11 System Administration

### 3.1.11.1 Data Recording

#### 3.1.11.1.1 ATC Operations Data {Core}

The TFDM System **shall** [1689] record all input and output data and messages from TFDM and external systems as required by Order JO 7210.3, Facility Operations and Administration, and Order JO 7210.56, Air Traffic Quality Assurance.

#### 3.1.11.1.2 System Performance Data

##### 3.1.11.1.2.1 System Status and Performance Data {Core}

The TFDM System **shall** [1669] record all data to recreate the system status, performance, environment and displays.

##### 3.1.11.1.2.2 Monitoring and Control Data {Core}

The TFDM System **shall** [62] record system monitoring, control, and maintenance data.

##### 3.1.11.1.2.3 Record System Events {Core}

The TFDM System **shall** [1138] record application events.

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## **3.1.11.1.2.4 Record Notifications {Core}**

The TFDM System **shall** [59] record all notifications.

## **3.1.11.1.2.5 TFDM User Inputs {Core}**

The TFDM System **shall** [60] record all user inputs.

## **3.1.11.1.2.6 TFDM User Display {Core}**

The TFDM System **shall** [61] record all messages displayed to the user.

## **3.1.11.1.2.7 Security Data {Core}**

The TFDM System **shall** [63] record security actions and data.

## **3.1.11.1.2.8 Record Error Messages {Core}**

The TFDM System **shall** [924] record error messages.

## **3.1.11.1.2.9 Record Date and Time {Core}**

The TFDM System **shall** [1671] date and time stamp recorded data.

## **3.1.11.1.3 DST Recommendations {Core}**

The TFDM System **shall** [57] record DST recommendations.

## **3.1.11.2 Archiving**

### **3.1.11.2.1 Archive Data {Core}**

The TFDM System **shall** [64] archive recorded data in accordance with FAA Order JO 7210.3 Facility Operation and Administration.

### **3.1.11.2.2 Select Data for Retention {Core}**

The TFDM System **shall** [1666] allow authorized users to select for the retention of specific recorded data.

## **3.1.11.3 Playback**

### **3.1.11.3.1 Data Retrieval {Core}**

The TFDM System **shall** [65] allow for search and retrieval of archived data by authorized users.

### **3.1.11.3.2 Playback of User Positions {Core}**

The TFDM System **shall** [66] allow playback of recorded data on user positions.

### **3.1.11.3.3 Playback Without Interference {Core}**

The TFDM System **shall** [1673] allow playback of recorded data at a selected position without interference to ATC operations.

## **3.1.11.4 Adaptation**

### **3.1.11.4.1 Adaptation {Core}**

The TFDM System **shall** [67] have capability to adapt ATC facility layout, operational requirements, and procedures.

### **3.1.11.4.2 Adaptation Tools {Core}**

The TFDM System **shall** [980] have tools for facility adaptation.



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## **3.1.11.4.3 Adaptation Modification Tools {Core}**

The TFDM System **shall** [981] have tools for facility adaptation modification.

## **3.1.11.5 Reports**

### **3.1.11.5.1 Generate Reports {Core}**

The TFDM System **shall** [69] generate the following reports:

- a. Traffic Statistics
- b. System Status
- c. Performance
- d. Recorded Data
- e. DST Recommendations
- f. System Configuration

### **3.1.11.5.2 Print Incident Reports {Core}**

The TFDM System **shall** [1667] allow authorized users to generate incident reports as specified in FAA Order JO 7210.3 and Order JO 7210.56.

### **3.1.11.5.3 Print Other Reports {Core}**

The TFDM System **shall** [1668] print ATC operational information and data, including graphical plots based on user input.

## **3.1.11.6 Data Reduction and Analysis (DR&A)**

### **3.1.11.6.1 Reduce Data {Core}**

The TFDM System **shall** [1675] have Data Reduction and Analysis program to filter recorded data including operational and system performance data based on authorized user input.

### **3.1.11.6.2 Analyze Data {Core}**

The TFDM System **shall** [1674] have capability to analyze all extracted system performance data including processing and memory capacity based on authorized user input.

## **3.1.11.7 Manage Local Data**

## **3.1.12 Monitoring and Control (M&C)**

### **3.1.12.1 Monitoring**

#### **3.1.12.1.1 Monitor System {Core}**

The TFDM System **shall** [71] monitor the status, integrity, and performance of all system resources and interfaces.

#### **3.1.12.1.2 Notify M&C on System Events {Core}**

The TFDM System **shall** [76] have aural and visual notifications to notify users of system failures, faults and interruptions.

#### **3.1.12.1.3 Detect Failures {Core}**

The TFDM System **shall** [1683] perform failure detection on all system software, hardware and interfaces.

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## 3.1.12.2 Control

### 3.1.12.2.1 Control System {Core}

The TFDM System **shall** [72] control system functions including startup, shutdown, restart, reconfiguration, software download, software cutover and system analysis of the TFDM System and components.

### 3.1.12.2.2 Update Software {Core}

The TFDM System **shall** [75] allow software updates without interruption to air traffic control operations.

### 3.1.12.2.3 Distribute M&C Data {Core}

The TFDM System **shall** [77] distribute monitoring, control, and maintenance data to user upon request.

### 3.1.12.2.4 Terminate Interfaces {Core}

The TFDM System **shall** [1682] terminate any external interfaces based on user input.

### 3.1.12.2.5 Restart System Capability {Core}

The TFDM System **shall** [1685] have restart capability at the M&C position based on user input.

## 3.1.12.3 Display

### 3.1.12.3.1 Display M&C Data {Core}

The TFDM System **shall** [78] display monitoring, control, and maintenance data and fault conditions.

### 3.1.12.3.2 Notify User on Boot {Core}

The TFDM System **shall** [1040] display system state to operational positions to indicate that the system is not at full operational status during a boot up or reboot.

## 3.1.12.4 System Recovery

### 3.1.12.4.1 System Recovery {Core}

The TFDM System **shall** [73] provide manual recovery of the TFDM System after aborts and planned and unplanned interrupts to the TFDM System from the M&C position.

## 3.1.12.5 Maintenance

### 3.1.12.5.1 Maintenance {Core}

The TFDM System **shall** [74] allow user to perform hardware, software and interfaces fault diagnostics, detection, and isolation from the M&C position.

## 3.1.12.6 Quality Assurance (QA)

### 3.1.12.6.1 Certification {Core}

The TFDM System **shall** [1688] have the tools for the M&C Operator to perform system certification from the M&C position.

## 3.1.12.7 Remote Monitoring and Logging System

### 3.1.12.7.1 Remote Monitor and Control by RMLS {Core}

The TFDM System **shall** [1694] have the capability for remote monitor and control by RMLS.

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## 3.1.12.7.2 System Status and Event Data to RMLS {Core}

The TFDM System shall [1695] send system status and event data to RMLS.

## 3.2 Performance Requirements

*Note: Additional research needed to determine TFDM system and individual service performance requirements as well as additional performance requirements not listed below. Requirements will be allocated to Core or WPs as part of the performance analysis.*

### 3.2.1 General System Performance

#### 3.2.1.1 General Processing Performance

##### 3.2.1.1.1 Time Synchronization {Core}

The TFDM System shall [81] utilize Coordinated Universal Time (UTC) for internal clock synchronization.

##### 3.2.1.1.2 Maximum Process Response Time at 95th Percentile {Core}

The TFDM System shall [2030] produce outputs in response to inputs within TBD seconds for the 95th percentile.

##### 3.2.1.1.3 Maximum Process Response Time {Core}

The TFDM System shall [2040] produce outputs in response to inputs within TBD seconds.

#### 3.2.1.2 General Workload Performance

##### 3.2.1.2.1 Processor Utilization {Core}

The TFDM System shall [1835] utilize less than 50% processor utilization at peak load at system delivery.

##### 3.2.1.2.2 Retain Flight Data Storage Capacity {Core}

The TFDM System shall [1141] have the capacity to retain flight data for up to TBD flights.

#### 3.2.1.3 General Recovery Performance

##### 3.2.1.3.1 Maximum Cold Start Time {Core}

The TFDM System shall [1039] boot from a cold start to full operational status within TBD minutes.

##### 3.2.1.3.2 Maximum Warm Start Time {Core}

The TFDM System shall [2031] boot from a warm start to full operational status within TBD minutes.

#### 3.2.1.4 General Reliability, Maintainability, and Availability (RMA) Performance

##### 3.2.1.4.1 Minimum Mean Time Between Failure (MTBF) {Core}

The TFDM System shall [2041] have a minimum MTBF of TBD hours.

##### 3.2.1.4.2 Maximum Mean Time to Restore (MTTR) {Core}

The TFDM System shall [80] have a maximum MTTR of TBD hours.

##### 3.2.1.4.3 Minimum Service Availability {Core}

The TFDM System shall [79] have a minimum operational service availability of TBD based on NAS-RD-2011.

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## 3.2.1.5 General UIS Performance

### 3.2.1.5.1 Maximum User Input Response Time {Core}

The TFDM System **shall** [2032] respond to user inputs within TBD seconds.

### 3.2.1.5.2 Window Recovery Time {Core}

The TFDM System **shall** [993] recover displays in presentation quality within TBD seconds of a window change.

## 3.2.2 FDS Performance

### 3.2.2.1 FDS Minimum Mean Time Between Failure (MTBF) {Core}

The TFDM System FDS **shall** [2034] have a minimum MTBF of TBD hours.

### 3.2.2.2 FDS Maximum MTTR {Core}

The TFDM System FDS **shall** [2035] have a maximum MTTR of TBD hours.

### 3.2.2.3 FDS Minimum Availability {Core}

The TFDM System FDS **shall** [1838] have a minimum operational service availability of TBD.

### 3.2.2.4 FDS Recovery Time {Core}

The TFDM System **shall** [2036] restore FDS service within TBD minutes following any failure.

### 3.2.2.5 FDS Maximum Process Time - 95th Percentile {Core}

The TFDM System FDS **shall** [1868] process an incoming message within TBD seconds for the 95th percentile.

### 3.2.2.6 Maximum FDS User Input Response Time at 95th Percentile {Core}

The TFDM System FDS **shall** [1870] respond to user inputs within TBD seconds for the 95th percentile.

### 3.2.2.7 FDS Data Message Dissemination Response Time - 95th Percentile {Core}

The TFDM System FDS **shall** [1872] disseminate data messages to external systems within TBD seconds after send instruction for the 95th percentile.

## 3.2.3 SDS Performance

### 3.2.3.1 SDS Minimum MTBF {Core}

The TFDM System SDS **shall** [1843] have a minimum MTBF of TBD hours.

### 3.2.3.2 SDS Maximum MTTR {Core}

The TFDM System SDS **shall** [2058] have a maximum MTTR of TBD hours.

### 3.2.3.3 SDS Minimum Service Availability {Core}

The TFDM System SDS **shall** [1844] have a minimum operational service availability of TBD.

### 3.2.3.4 SDS Recovery Time {Core}

The TFDM System **shall** [2059] restore SDS service within TBD minutes following any failure.

### 3.2.3.5 Maximum SDS User Input Response Time at 95th Percentile {Core}

The TFDM System SDS **shall** [2060] respond to user inputs within TBD seconds for the 95th percentile.

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## 3.2.3.6 SDS Target Display Response Time {Core}

The TFDM System **shall** [1839] display a target within TBD milliseconds after receipt from the surveillance system.

## 3.2.3.7 SDS Alert Response Time {Core}

The TFDM System **shall** [1841] display all safety alerts within TBD milliseconds after receipt from the surveillance system.

## 3.2.3.8 SDS Map Change Response Time {Core}

The TFDM System **shall** [974] display a new surveillance map within TBD seconds after user selection.

## 3.2.4 AIS Performance

### 3.2.4.1 AIS Minimum MTBF {Core}

The TFDM System AIS **shall** [2054] have a minimum MTBF of TBD hours.

### 3.2.4.2 AIS Maximum MTTR {Core}

The TFDM System AIS **shall** [2055] have a maximum MTTR of TBD hours.

### 3.2.4.3 AIS Minimum Service Availability {Core}

The TFDM System AIS **shall** [2056] have a minimum operational service availability of TBD.

### 3.2.4.4 AIS Recovery Time {Core}

The TFDM System **shall** [1428] restore AIS service within TBD minutes following any failure.

### 3.2.4.5 Maximum AIS User Input Response Time at 95th Percentile {Core}

The TFDM System AIS **shall** [2057] respond to user inputs within TBD seconds for the 95th percentile.

### 3.2.4.6 Maximum AIS Display Text Data Response Time {Core}

The TFDM System AIS **shall** [1425] display text data within TBD seconds of user input.

### 3.2.4.7 Maximum AIS Display Graphic Data Response Time {Core}

The TFDM System AIS **shall** [1426] display graphic data TBD seconds of user input.

### 3.2.4.8 AIS Display Data Updates Response Time {Core}

The TFDM System AIS **shall** [1427] display any data update within TBD seconds of valid user input.

## 3.2.5 AOPS Performance

### 3.2.5.1 General AOPS Performance

#### 3.2.5.1.1 AOPS Minimum MTBF {Core}

The TFDM System AOPS **shall** [2050] have a minimum MTBF of TBD hours.

#### 3.2.5.1.2 AOPS Maximum MTTR {Core}

The TFDM System AOPS **shall** [2051] have a maximum MTTR of TBD hours.

#### 3.2.5.1.3 AOPS Minimum Availability {Core}

The TFDM System AOPS **shall** [2052] have a minimum operational service availability of TBD.

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## 3.2.5.1.4 AOPS Recovery Time {Core}

The TFDM System **shall** [1845] restore AOPS services within TBD minutes following any failure.

## 3.2.5.1.5 AOPS Maximum User Input Response Time {Core}

The TFDM System AOPS **shall** [1849] respond to user inputs within TBD seconds.

## 3.2.5.2 PDC Performance

### 3.2.5.2.1 PDC Acknowledgement Timeout {Core}

The TFDM System PDC function **shall** [1850] send a timeout message to a controller if an acknowledgment from an FOC or DLSP has not been received within 2 minutes of PDC message distribution.

### 3.2.5.2.2 PDC Message Process Workload Minimum {Core}

The TFDM System PDC function **shall** [1851] process at least TBD PDC flights per minute for a TBD-minute period per ATCT facility.

### 3.2.5.2.3 PDC Clearance Process Workload Minimum {Core}

The TFDM System PDC function **shall** [1852] process at least TBD PDC clearances per minute per ATCT facility.

## 3.2.5.3 D-ATIS Performance

### 3.2.5.3.1 D-ATIS Text Message Acknowledgement {Core}

The TFDM System D-ATIS function **shall** [1854] acknowledge the input of a D-ATIS text message within TBD minutes.

### 3.2.5.3.2 D-ATIS Text to Speech Performance {Core}

TFDM System D-ATIS function **shall** [1855] output audio within TBD seconds of text to audio process start.

### 3.2.5.3.3 D-ATIS Message Restart Maximum {Core}

The TFDM System D-ATIS audio messages **shall** [1856] restart within TBD seconds of previous voice message termination.

## 3.2.5.4 DCL Performance

### 3.2.5.4.1 DCL Time-Critical Response Time Maximum at 95th Percentile {Core}

The TFDM System DCL function **shall** [1866] respond to time-critical, CPDLC user-messages within TBD seconds for the 95th percentile.

### 3.2.5.4.2 DCL Controller Initiated DCL Workload Minimum {Core}

The TFDM System DCL function **shall** [1860] support a peak controller-initiated DCL transaction rate of at least TBD transactions per minute.

### 3.2.5.4.3 DCL Revised DCL Workload Minimum {Core}

The TFDM System DCL function **shall** [1861] support a peak revised DCL transaction rate of at least TBD transactions per minute.

### 3.2.5.4.4 DCL Auto Initiate Workload Minimum {Core}

The TFDM System DCL function **shall** [1862] support a peak automatically-initiated DCL transaction rate of at least TBD transactions per minute.

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## **3.2.5.4.5 DCL Request Workload Minimum {Core}**

The TFDM System DCL function **shall** [1863] support a peak DCL Request transaction rate of at least TBD transactions per minute.

## **3.2.5.4.6 DCL Minimum CPDLC Connections to Airborne Aircraft {Core}**

The TFDM System DCL function **shall** [1864] maintain simultaneous CPDLC connections to at least TBD data communications equipped airborne aircraft.

## **3.2.6 TMS Performance - TBD**

## **3.2.7 AWS Performance - TBD**

## **3.2.8 DST Performance - TBD**

## **3.2.9 TSWIM Performance**

### **3.2.9.1 TSWIM Minimum MTBF {Core}**

The TFDM System TSWIM **shall** [1161] have a minimum MTBF of TBD hours.

### **3.2.9.2 TSWIM Maximum MTTR {Core}**

The TFDM System TSWIM **shall** [1164] have a maximum MTTR of TBD hours.

### **3.2.9.3 TSWIM Minimum Service Availability {Core}**

The TFDM System TSWIM **shall** [1162] have a minimum operational service availability of TBD.

### **3.2.9.4 TSWIM External System Input after Warm Restart {Core}**

The TFDM System TSWIM **shall** [1168] accept inputs from external systems within TBD minutes after a warm restart.

### **3.2.9.5 TSWIM External System Input after Cold Restart {Core}**

The TFDM System TSWIM **shall** [1169] accept inputs from external systems within TBD minutes after a cold restart.

### **3.2.9.6 TSWIM Maximum Process Response Time {Core}**

The TFDM System TSWIM **shall** [1166] produce outputs in response to inputs within TBD seconds.

### **3.2.9.7 TSWM Reconstitution Response Time {Core}**

The TFDM System TSWIM service **shall** [1167] reconstitute published flight data within TBD minutes of an external user request.

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## 3.2.10 Other Input Data

## 3.2.11 System Administration Performance

### 3.2.11.1 Data Recording Performance

### 3.2.11.2 Playback Performance

### 3.2.11.3 Data Reduction and Analysis Performance

## 3.2.12 Monitor and Control System Performance

## 3.3 Product Characteristics

### 3.3.1 Extensibility {Core}

The TFDM System **shall** [82] accommodate functional enhancements to include:

- a. Full range of DSTs
- b. Others TBD

### 3.3.2 Scalability {Core}

The TFDM System **shall** [83] accommodate various airport sizes with varying traffic loads.

### 3.3.3 Flexibility {Core}

The TFDM System **shall** [84] accommodate various airport configurations (multiple towers, number of runways, number of control positions, etc.).

### 3.3.4 Adaptability {Core}

The TFDM System **shall** [2033] be configurable to support local and national procedures.

## 4 Physical Integration {Core}

### 4.1 Real Property

#### 4.1.1 Land

The TFDM system **shall** [86] integrate into existing FAA facilities.

#### 4.1.2 Space

The TFDM System **shall** [87] integrate into existing ATCT facility space.

#### 4.1.3 Equipment Racks

##### 4.1.3.1 Equipment Racks

The TFDM System installation **shall** [88] comply with electrical safety minimum clear working space requirements in accordance with 29 Code of Federal Regulations (CFR) 1910.303 and applicable tables S-2 and S-2.

##### 4.1.3.2 Equipment Sizing

The TFDM System **shall** [91] fit within the available footprint of the equipment in the tower that it replaces.



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## 4.2 Reserved

## 4.3 Environmental

### 4.3.1 Property Transactions

The TFDM Program **shall** [327] comply with FAA Order 1050.19, Environmental Due Diligence Audits in the Conducting Real Property Transactions.

### 4.3.2 Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) Compliance

The TFDM Program **shall** [92] evaluate the environmental impacts of the construction and operation of program equipment, in accordance with the *National Environmental Policy Act (NEPA)* and *FAA Order 1050.1, Policies and Procedures for Considering Environmental Impacts*.

### 4.3.3 Pollution Control and Prevention

TFDM Program **shall** [328] meet the requirements of FAA Order 1050.10, Prevention, Control and Abatement of Environmental Pollution, and applicable federal, state and local environmental requirements pertaining to air emissions limits on equipment, storm water management, erosion and sediment control, and local noise ordinances.

### 4.3.4 Recycling

The TFDM Program **shall** [93] comply with Executive Order (EO) 12873, "Federal Acquisition, Recycling, and Waste Prevention."

### 4.3.5 National Environmental Policy Act (NEPA) Compliance

The TFDM Program **shall** [94] comply with:

- a. FAA Order 1050.1, "Policies and Procedures for Considering Environmental Impacts,"
- b. NEPA of 1969,
- c. FAA Order 1050.10, "Prevention, Control, and Abatement of Environmental Pollution at FAA Facilities," and
- d. 40 CFR, "Protection of the Environment."

## 4.4 Energy Conservation

### 4.4.1 Energy Conservation

The TFDM Program **shall** [492] comply with:

- a. Executive Order 1(EO) 3423, Strengthening Federal Environmental, Energy, and Transportation Management
- b. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance
- c. 42 United States Code (USC), Section 8287, The National Energy Conservation Policy Act
- d. Public Law 109-58, The Energy Policy Act of 2005
- e. 42 USC 8253, Energy Management and Performance Requirements for Federal Building, as amended by the Energy Independence and Security Act, Section 431
- f. FAA Order 1053.1, Energy and Water Management Program for FAA Buildings and Facilities

### 4.4.2 Energy Efficiency

The TFDM Program **shall** [493] implement energy efficiency in program planning activities and equipment selection, in accordance with Public Law 110-40, Energy Independence and Security Act of 2007 (EISA), and Public Law 109-58, Energy Policy Act of 2005.

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## 4.5 Heating, Ventilation, Air Conditioning (HVAC)

### 4.5.1 HVAC

The TFDM System **shall** [96] utilize existing HVAC capacity of the facility.

## 4.6 Grounding, Bonding, Shielding, and Lightning Protection

### 4.6.1 System Compatibility

The TFDM Program **shall** [97] comply with the grounding, bonding, shielding, control of electrostatic discharge (ESD), and lightning protection for all program electronic equipment, including FAA equipment at non-FAA facilities, as required by:

- a. Department of Transportation (DOT) Standard FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Equipment
- b. DOT Specification FAA-G-2100, Electronic Equipment, General Requirements
- c. National Fire Protection Association (NFPA) 70, National Electric Code
- d. NFPA 70E, Standard for Electrical Safety in the Workplace
- e. American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) Standard 1100-2005, Recommended Practice for Powering and Grounding Electrical Equipment

## 4.7 Cables

### 4.7.1 Cable Installation

The TFDM System cables, including fiber optics, **shall** [99] comply with FAA-G-2100.

### 4.7.2 Cable Size

The TFDM System cables **shall** [100] comply with NFPA 70, "National Electrical Code."

## 4.8 Hazardous Materials (HAZMAT)

### 4.8.1 General HAZMAT Requirements

The TFDM Program **shall** [481] comply with occupational safety and health requirements in accordance with 29 CFR 1910, Subpart H (Hazardous Materials), Subpart I (Personal Protective Equipment) and Subpart J (General Environmental Controls).

### 4.8.2 Environmental Requirements

The TFDM Program **shall** [482] comply with environmental requirements in 40 CFR, Chapter 1, Subchapter I (Solid Wastes) and hazardous materials shipping requirements in 49 CFR, Chapter 1, Subchapter C (Hazardous Materials Regulations).

### 4.8.3 Use of Hazardous Materials

The TFDM Program **shall** [483] comply with Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, and Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance in the use of hazardous materials in the design, manufacture, installation and operation of TFDM system.

### 4.8.4 Special Disposal Procedures

The TFDM Program **shall** [484] comply with Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, and Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

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## **4.8.5 Reutilization and Disposition Plan**

The TFDM Program **shall** [485] implement the handling, storage, and disposal requirements for any hazardous materials in the equipment as required by 42 USC 6901, Resource Conservation, and FAA Order 4600.27, Personal Property Management.

## **4.8.6 Material Safety Data Sheets**

### **4.8.6.1 Material Safety Data Sheets (MSDS)**

The TFDM Program **shall** [486] deliver the MSDS for hazardous materials used in equipment with delivery of the first TFDM installation.

### **4.8.6.2 MSDS Available for Site Personnel**

The TFDM Program **shall** [1551] have MSDS for hazardous materials used in TFDM activities available to site personnel in the work area, in accordance with 29 CFR 1910.1200, Hazard Communication.

## **4.8.7 Lead and Mercury**

TFDM Program **shall** [487] comply with FAA Order 1050.10, Prevention, Control, and Abatement of FAA Environmental Pollution, in the use of lead and mercury in TFDM equipment.

## **4.8.8 Ozone Depleting Substances**

TFDM Program **shall** [488] deliver equipment free of Class I ozone-depleting substances (ODSs), Hydrochlorofluorocarbon (HCFC-22), HCFC-141b, and HCFC-142b, in accordance with 40 CFR 82, Protection of Stratospheric Ozone.

## **4.8.9 Polychlorinated Biphenyls (PCBs)**

TFDM Program **shall** [489] deliver equipment free of polychlorinated biphenyls (PCBs), in accordance with 40 CFR 761.

## **4.8.10 Asbestos**

TFDM Program **shall** [490] deliver equipment free of asbestos, in accordance with 42 USC, Chapter 85, Clean Air Act (CAA) and Public Law 94-469, Toxic Substances Control Act (TSCA).

## **4.8.11 Asbestos Inspection**

The TFDM Program **shall** [491] ensure that personnel are protected from asbestos hazards during any planned renovation and demolition activities, in accordance with 29 CFR 1910.1001, Asbestos, and FAA Order 1050.20, Airway Facilities Asbestos Control Program.

## **4.9 Power Systems and Commercial Power**

### **4.9.1 Power Standards**

The TFDM System **shall** [104] comply with the following documents and standards:

- a. FAA-G-2100
- b. NFPA 70

## **4.10 Telecommunication Services**

### **4.10.1 Telecommunications Services**

The TFDM System **shall** [105] comply with FAA Order 1830.10, "Managing New Telecommunications Requirements"

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## 4.11 Seismic Safety

### 4.11.1 Seismic Safety

The TFDM equipment **shall** [334] comply with DOT Specification FAA-G-2100, Electronic Equipment, General Requirements, Section 3.3.5, Personnel Safety and Health.

## 5 Functional Integration

### 5.1 Integration With Other FAA Enterprise Architecture Elements

#### 5.1.1 General Interfaces

##### 5.1.1.1 Integration with Other FAA Enterprise Architecture Elements {Core}

The TFDM System **shall** [107] cause no degradations to other NAS Systems with which it interacts.

#### 5.1.2 Flight Data Services

##### 5.1.2.1 Legacy Interfaces

###### 5.1.2.1.1 Exchange Data with FDIO {Core}

The TFDM System **shall** [495] exchange data with FDIO in accordance with *NAS MD-581, Flight Data Input/Output System, Software Interface Control Document, October 2007*.

###### 5.1.2.1.2 Exchange Data with TAMR {Core}

The TFDM System **shall** [497] exchange data with TAMR in accordance with *IRD TBD*.

##### 5.1.2.2 New Interfaces

###### 5.1.2.2.1 Publish Flight Data to ERAM {Core}

The TFDM System **shall** [531] publish flight data to ERAM in accordance with *ERAM to SWIM Provider IRD TBD*.

###### 5.1.2.2.2 Subscribe to ERAM Flight Data {Core}

The TFDM System **shall** [532] subscribe to ERAM flight data in accordance with *En Route Automation Modernization (ERAM) to SWIM Service Consumer IRD, Draft, November 9, 2009*.

#### 5.1.3 Surveillance Data Services

##### 5.1.3.1 Legacy Interfaces

###### 5.1.3.1.1 Receive ASDE-X Data {Core}

The TFDM System **shall** [498] receive ASDE-X surveillance data in accordance with *IRD TBD*.

###### 5.1.3.1.2 Receive ASSC Data {Core}

The TFDM System **shall** [499] receive ASSC surveillance data in accordance with *IRD TBD*.

###### 5.1.3.1.3 Receive LCGS {Core}

The TFDM System **shall** [1536] receive LCGS surveillance data in accordance with *IRD TBD*.

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## 5.1.3.2 New Interfaces

### 5.1.3.2.1 Publish ASDE-X Data {Core}

The TFDM System **shall** [1752] publish ASDE-X surveillance data in accordance with *TFDM ASDE-X to SWIM Provider IRD TBD*.

### 5.1.3.2.2 Publish ASSC Data {Core}

The TFDM System **shall** [1753] publish ASSC surveillance data in accordance with *TFDM ASSC to SWIM Provider IRD TBD*.

### 5.1.3.2.3 Publish LCGS Data {Core}

The TFDM System **shall** [1754] publish LCGS surveillance data in accordance with *TFDM LCGS to SWIM Provider IRD TBD*.

## 5.1.4 Airport Weather Services

### 5.1.4.1 Legacy Interfaces

#### 5.1.4.1.1 Receive WME Data {Core}

The TFDM System **shall** [504] receive WME data in accordance with *Wind Measuring Equipment (WME) Climatronics & Loral To NAS Information Display System (NIDS) IRD, NAS-IR-51143118, May 21, 2010*.

#### 5.1.4.1.2 Receive DASI Data {Core}

The TFDM System **shall** [505] receive DASI data in accordance with *Digital Altimeter Setting Indicator (DASI) to NAS Information Display System (NIDS) IRD, NAS-IR-82153118, May 21, 2010*.

#### 5.1.4.1.3 Receive ASOS Data {Core}

The TFDM System **shall** [506] receive ASOS data in accordance with *Automated Surface Observation System (ASOS) to NAS Information Display System (NIDS) IRD, NAS-IR-31063118, May 21, 2010*.

#### 5.1.4.1.4 Receive ACE-IDS Data {Core}

The TFDM System **shall** [507] receive ACE-IDS data in accordance with *ASOS Controller Equipment Information Display System (ACE-IDS) to NAS Information Display System (NIDS) IRD, NAS-IR-31083118, May 21, 2010*.

#### 5.1.4.1.5 Receive SAWS Data {Core}

The TFDM System **shall** [508] receive SAWS data in accordance with *Stand Alone Weather Sensor's (SAWS) Via Control Display Unit (CDU) to NAS Information Display System (NIDS) IRD, NAS-IR-31203118, May 21, 2010*.

#### 5.1.4.1.6 Receive AWSS Data {Core}

The TFDM System **shall** [509] receive AWSS data in accordance with *Automated Weather Sensor System (AWSS) to NAS Information Display System (NIDS) IRD, NAS-IR-31193118, May 21, 2010*.

#### 5.1.4.1.7 Receive AWOS {Core}

The TFDM System **shall** [1537] receive weather data from AWOS in accordance with *IRD TBD*.

#### 5.1.4.1.8 Receive Weather and RADAR Processor (WARP) Data {Core}

The TFDM System **shall** [510] receive WARP data in accordance with *Weather and RADAR Processor to NAS Information Display System (NIDS) IRD, NAS-IR-25153118, May 21, 2010*.

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## 5.1.4.1.9 Receive LLWAS Data {Core}

The TFDM System **shall** [511] receive LLWAS data in accordance with *Low Level Windshear Alert System (LLWAS) to TFDM IRD TBD and External Systems that use a Ribbon Display Terminal (RBDT) to NAS Information Display System (NIDS) IRD, NAS-IR-31180001, May 21, 2010.*

## 5.1.4.1.10 Receive TDWR Data {Core}

The TFDM System **shall** [512] receive TDWR data in accordance with *Terminal Doppler Weather RADAR to TFDM IRD, TBD, and External Systems that use a Ribbon Display Terminal (RBDT) to NAS Information Display System (NIDS) IRD, NAS-IR-31180001, May 21, 2010.*

## 5.1.4.1.11 Receive WSP Data {Core}

The TFDM System **shall** [513] receive WSP data in accordance with *Weather Sensor Processor to TFDM IRD TBD and External Systems that use a Ribbon Display Terminal (RBDT) to NAS Information Display System (NIDS) IRD, NAS-IR-31180001, May 21, 2010.*

## 5.1.4.1.12 Receive CIWS Data {Core}

The TFDM System **shall** [514] receive CIWS data in accordance with *CIWS to TFDM IRD TBD.*

## 5.1.4.1.13 Receive ITWS Data {Core}

The TFDM System **shall** [515] receive ITWS data in accordance with *ITWS to TFDM IRD TBD.*

## 5.1.4.1.14 Receive FDIO Weather Data {Core}

The TFDM System **shall** [516] receive the following FDIO weather data in accordance with *Flight Data Input/Output (FDIO) System to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-82013118, May 21, 2010:*

- a. AIRMET – AIRman’s METeorological Information
- b. CONVECTIVE SIGMET - SIGNificant METeorological Event
- c. CWA – Center Weather Advisory
- d. UCWA – Urgent Center Weather Advisory
- e. PIREPS - Pilot Reports

## 5.1.4.1.15 Receive RVR Data {Core}

The TFDM System **shall** [518] receive RVR data in accordance with *Runway Visual Range System to NAS Information Display System (NIDS) IRD, NAS-IR-33113118, May 21, 2010.*

## 5.1.4.2 New Interfaces

### 5.1.4.2.1 Subscribe to CIWS Data {Core}

The TFDM System **shall** [540] subscribe to CIWS data in accordance with *CIWS to SWIM Service Consumer IRD TBD.*

### 5.1.4.2.2 Subscribe to ITWS Data {Core}

The TFDM System **shall** [541] subscribe to ITWS data in accordance with *Integrated Terminal Weather Service (ITWS) to SWIM Service Consumer IRD TBD.*

### 5.1.4.2.3 Subscribe to NextGen SOC Data {WP}

The TFDM System **shall** [542] subscribe to NextGen SOC data in accordance with *NextGen Surface Observing Capability (SOC) to SWIM Service Consumer IRD TBD.*

### 5.1.4.2.4 Subscribe to NNEW {Core}

The TFDM System **shall** [1759] subscribe to NNEW data in accordance with *NNEW to SWIM Service Consumer IRD TBD.*

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## **5.1.4.2.5    Subscribe to NWP {Core}**

The TFDM System **shall** [2083] subscribe to NWP data in accordance with NWP to SWIM Service Consumer IRD TBD.

## **5.1.4.2.6    Subscribe to RVR Data {Core}**

The TFDM System **shall** [1756] subscribe to RVR data in accordance with *RVR to SWIM Service Consumer IRD TBD*.

## **5.1.4.2.7    Subscribe to WSDS {WP}**

The TFDM System **shall** [2084] subscribe to WSDS data in accordance with WSDS to SWIM Service Consumer IRD TBD.

## **5.1.4.2.8    Publish RVR Data {Core}**

The TFDM System **shall** [1755] publish RVR data in accordance with *RVR to SWIM Service Provider IRD TBD*.

## **5.1.5    Aeronautical Information Services**

### **5.1.5.1    Legacy Interfaces**

#### **5.1.5.1.1    Receive Global Positioning System (GPS) Time Source (GTS) Data {Core}**

The TFDM System **shall** [517] receive GTS data in accordance with *IRD TBD*.

#### **5.1.5.1.2    Receive Data Using a Browser Interface {Core}**

The TFDM System **shall** [528] receive external data from a browser interface in accordance with *Air Traffic Control Data Sources to NAS Information Display System (NIDS) via Web Services IRD, NAS-IR-32063118, May 21, 2010*.

### **5.1.5.2    New Interfaces**

#### **5.1.5.2.1    Subscribe to FNS Data {Core}**

The TFDM System **shall** [1539] subscribe to FNS data in accordance with *Federal NOTAM System (FNS) to SWIM Service Consumer IRD TBD*.

#### **5.1.5.2.2    Subscribe to ACS Data {Core}**

The TFDM System **shall** [543] subscribe to ACS data in accordance with *ACS to SWIM Service Consumer IRD TBD*.

#### **5.1.5.2.3    Subscribe to AGIS Data {Core}**

The TFDM System **shall** [1757] subscribe to AGIS data in accordance with *AGIS to SWIM Service Consumer IRD TBD*.

#### **5.1.5.2.4    Publish Data to FNS {Core}**

The TFDM System **shall** [1541] publish to FNS in accordance with *FNS to SWIM Service Provider IRD TBD*.

#### **5.1.5.2.5    Publish Data to ACS {Core}**

The TFDM System **shall** [1542] publish TFDM AIS data to ACS in accordance with *ACS to SWIM Service Provider IRD TBD*.

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## 5.1.5.2.6 Publish Data to AGIS {Core}

The TFDM System **shall** [1758] publish local airport data to AGIS in accordance with *AGIS to SWIM Service Provider IRD TBD*.

## 5.1.6 Traffic Management Services

### 5.1.6.1 Legacy Interfaces

#### 5.1.6.1.1 Exchange Data with TFMS {Core}

The TFDM System **shall** [2061] exchange data with TFMS in accordance with *IRD TBD*.

### 5.1.6.2 New Interfaces

#### 5.1.6.2.1 Subscribe to TFMS Data {Core}

The TFDM System **shall** [545] subscribe to TFMS data in accordance with *TFMS to SWIM Service Consumer IRD TBD*.

#### 5.1.6.2.2 Subscribe to TBFM Data {Core}

The TFDM System **shall** [546] receive TBFM data in accordance with *TBFM to SWIM Service Consumer IRD TBD*.

#### 5.1.6.2.3 Publish Data to TFMS {Core}

The TFDM System **shall** [1762] publish data to the TFMS in accordance with *TFMS to SWIM Service Provider IRD TBD*.

#### 5.1.6.2.4 Publish Data to TBFM System {Core}

The TFDM System **shall** [1763] publish data to the TBFM in accordance with *TBFM to SWIM Service Provider IRD TBD*.

## 5.1.7 Aircraft, Operator, Pilot Services

### 5.1.7.1 Legacy Interfaces

#### 5.1.7.1.1 Send D-ATIS Messages {Core}

The TFDM System **shall** [525] send D-ATIS messages to the Audio Distribution Unit (ADU) in accordance with *IRD TBD*.

#### 5.1.7.1.2 Send PDC Messages {Core}

The TFDM system **shall** [1760] send PDC messages to TDLS Information Management System (TIMS) in accordance with *IRD TBD*.

#### 5.1.7.1.3 Exchange DCL Messages {Core}

The TFDM system **shall** [1761] exchange DCL messages with the TDLS Information Management System (TIMS) in accordance with *IRD TBD*.

### 5.1.7.2 New Interfaces

#### 5.1.7.2.1 Subscribe to FOCs Data {WP}

The TFDM System **shall** [555] subscribe to FOC data in accordance with *FOC to SWIM Service Consumer IRD TBD*.



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## 5.1.7.2.2 Subscribe to DLSPs Data {WP}

The TFDM System **shall** [559] subscribe DLSP data in accordance with *DLSP to SWIM Service Consumer IRD TBD*.

## 5.1.7.2.3 Subscribe to Ramp Tower Data {WP}

The TFDM System **shall** [557] subscribe to Ramp Tower data in accordance with *Ramp Tower to SWIM Service Consumer IRD TBD*.

## 5.1.7.2.4 Subscribe to Airport Authority Data {WP}

The TFDM System **shall** [558] subscribe to Airport Authority data in accordance with *Airport Authority to SWIM Service Consumer IRD TBD*.

## 5.1.7.2.5 Publish Data to FOCs {WP}

The TFDM System **shall** [1543] publish data to FOCs in accordance with *FOC to SWIM Service Provider IRD TBD*.

## 5.1.7.2.6 Publish Data to DLSPs {WP}

The TFDM System **shall** [1764] publish data to DLSPs in accordance with *DLSP to SWIM Service Provider IRD TBD*.

## 5.1.7.2.7 Publish Data to Ramp Towers {WP}

The TFDM System **shall** [1545] publish data to the Ramp Towers in accordance with *Ramp Towers to SWIM Service Provider IRD TBD*.

## 5.1.7.2.8 Publish Data to Airport Authorities {WP}

The TFDM System **shall** [1546] publish data to Airport Authorities in accordance with *Airport Authority to SWIM Service Provider IRD TBD*.

## 5.1.8 Other

### 5.1.8.1 Legacy Interfaces

#### 5.1.8.1.1 Send Remote Maintenance and Monitoring System (RMMS) Data {Core}

The TFDM System **shall** [529] exchange data with the RMMS System in accordance with *NAS-IR-51015108*.

### 5.1.8.2 New Interfaces

#### 5.1.8.2.1 Publish Data to Remote Maintenance Monitoring System (RMMS) {Core}

The TFDM System **shall** [552] publish data to RMMS in accordance with *RMMS to SWIM Service Consumer IRD TBD*.

#### 5.1.8.2.2 Exchange Data with Customs {WP}

The TFDM System **shall** [553] exchange data with Customs in accordance with *IRD TBD*.

#### 5.1.8.2.3 Exchange Data with Department of Defense (DoD) {WP}

The TFDM System **shall** [554] exchange data with the DoD in accordance with *IRD TBD*.

## 5.2 Information Requirements {Core}

The TFDM System **shall** [108] utilize surveillance and flight data to support terminal ATC services.

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## 5.3 Software Integration {Core}

The TFDM System software **shall** [109] be compatible with the NAS Systems with which it is integrated.

## 5.4 Spectrum Assignment {Core}

The TFDM System **shall** [330] not require spectrum assignment for operations.

## 5.5 Standardization

### 5.5.1 Industry Standards {Core}

The TFDM System **shall** [111] use industry standard, vendor independent operating Systems, programming languages, and communication protocols.

### 5.5.2 Interoperability {Core}

The TFDM System **shall** [331] interoperate with NAS Systems.

### 5.5.3 Portability {Core}

The TFDM System **shall** [332] port across multiple hardware platforms.

### 5.5.4 Maintenance {Core}

The TFDM System **shall** [333] be maintainable in accordance with FAA Order 6000.15F.

### 5.5.5 Platform {Core}

The TFDM application software **shall** [112] port across various platforms.

### 5.5.6 DO-278 Compliance {Core}

The TFDM System **shall** [685] comply with DO-278 level 3 design assurance practices.

## 6 Human Integration {Core}

### 6.1 Human/Product Interface

#### 6.1.1 General

The TFDM Program **shall** [113] address Human Factors in the design, development, and test of the TFDM System in accordance with FAA Order 9550.8, “Human Factors Policy”.

#### 6.1.2 Compliance with ASD-100-SSE-1

The TFDM Program **shall** [114] analyze all human-to-system interfaces for system safety and personnel safety hazards in accordance with ASD-100-SSE-1, *NAS Modernization System Safety Management Program*.

#### 6.1.3 Human Factors Program

The TFDM Program **shall** [115] establish a Human Factors Program in accordance with the “FAA Human Factors Job Aid.”

#### 6.1.4 Human Engineering Program

The TFDM Program **shall** [116] conduct a Human Engineering Program in accordance with MIL-HDBK-46855A, “Human Engineering (HE) Program Process and Procedures,” Section 4 “Program Tasks” and Section 7 “HE Procedures for Contractors.”

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## 6.1.5 Human-Centered Design

### 6.1.5.1 General

The TFDM System human-to-system interfaces **shall** [117] apply human-centered design processes in accordance with International Standards Organization (ISO) 13407, Human-Centered Design Processes and ISO Technical Report 18529, Human-Centered Lifecycle Process Description.

### 6.1.5.2 Usability

The TFDM System human-system integration **shall** [118] comply with DOT/FAA/CT-03/05 HF-STD-001, “Human Factors Design Standard (HFDS) for Acquisition of Commercial Off-The-Shelf (COTS) Subsystems, Non-Developmental Items, and Developmental Systems,” Chapter 3.1 *General* and 3.2 *Design and Evaluation*.

### 6.1.5.3 Operational Suitability

TFDM human-to-system interfaces **shall** [119] comply with the HFDS, Chapter 2.4 *Standardization* and 3.1 *General* in order to ensure that they are compatible and consistent within and across System and NAS elements.

### 6.1.5.4 Function Allocation

The TFDM System allocation of user functions **shall** [120] comply with the HFDS, revised Chapter 3.11 Function Allocation/Levels of Automation.

### 6.1.5.5 Human Capabilities and Limitations

The TFDM System displays and attendant commands and controls **shall** [121] comply with the HFDS, Chapter 3.4 *Interface* to ensure compatibility with human perceptual and cognitive capabilities and limitations.

## 6.1.6 Human-to-System Interfaces

### 6.1.6.1 Error Resistance

The TFDM System human-to-system interfaces **shall** [427] comply with the HFDS, Chapter 2.5.3 *Make systems error resistant* to ensure interfaces exclude the potential for human error that affects system safety or personnel safety.

### 6.1.6.2 Error Tolerance

The TFDM System human-to-system interfaces **shall** [428] comply with the HFDS, Chapter 2.5.4 *Make systems error tolerant* and Chapter 3.1.18 *Make it error resistant and error tolerant*.

### 6.1.6.3 Error Recovery

The TFDM System **shall** [429] have an operationally suitable and efficient means of recovery from human error.

## 6.1.7 Communications and Teamwork

The TFDM System **shall** [2070] comply with the HFDS, Section 3.2.3 *Consider Effects on Coordination* with respect to personnel communication and information interchange.

## 6.1.8 Automation Guidelines

### 6.1.8.1 General

TFDM human-to-system interfaces **shall** [124] comply with the HFDS, Chapter 2 *General Design Requirements*, and Chapter 3 *Automation*.

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## 6.1.8.2 Infrequent Critical Tasks

The TFDM System human-to-system interfaces **shall** [431] comply with the HFDS, Chapter 2.5.7 *Provide emergency procedures for critical systems* for user ease of handling infrequent, critical situations and emergencies.

## 6.1.8.3 Automation Function Indications

The TFDM System **shall** [432] indicate to the user when automation functions are enabled and when they are disabled in accordance with the HFDS Chapter 3.3 *System response and feedback* and 2. Chapter 3.6 *Modes*>

## 6.1.8.4 Degraded Mode Operation

The TFDM System human-to-system interfaces **shall** [433] comply with the HFDS, Chapter 3.6.6 *Provide consistent features and functions* to ensure efficient, accurate use during degraded modes (when one or more functions are disabled).

## 6.1.8.5 Fault Management

The TFDM System **shall** [434] have automated diagnostics aids to enable fault management and System failure recovery through timely user notification of specific failures or potential failures in accordance with the HFDS, Chapter 3.8, *Fault Management*.

## 6.1.9 Computer-Human Interface Requirements

### 6.1.9.1 General

The TFDM System Computer-Human Interface (CHI) interfaces **shall** [125] comply with the HFDS, Chapter 8 *Computer Human Interface*.

### 6.1.9.2 Screen Design

The TFDM System screen designs **shall** [435] comply with the HFDS Chapter 8.1 *Screen Design*.

### 6.1.9.3 Visual Coding

The TFDM System visual coding **shall** [436] be in accordance with the HFDS, Chapter 8.6 *Coding*.

### 6.1.9.4 Color-Coding

The TFDM System color-coding **shall** [437] comply with the HFDS, Chapter 8.6 *Coding* and Chapter 8.6.2 *Color*.

### 6.1.9.5 Redundant Coding

The TFDM System color-coding **shall** [438] have a second, redundant coding dimension in accordance with the HFDS, Chapter 8.6.2.1.5 *Redundant Use*.

### 6.1.9.6 Auditory Alerts and Alarms

The TFDM System alarms and alerts **shall** [439] comply with the HFDS, Chapter 7 *Alarms, audio, and voice communications*.

### 6.1.9.7 User Interaction

The TFDM System user-to-system interactions **shall** [440] comply with the HFDS Chapter 8.7 *Interaction* and Chapter 8.8 *General Interactive techniques*.

### 6.1.10 Displays and Controls

The TFDM System displays and controls **shall** [128] comply with the HFDS, Chapter 6 *Control and Visual Integration*, and Chapter 9, *Input Devices*.

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## 6.1.11 Displays

The TFDM System displays **shall** [2072] comply with the HFDS, Chapter 5 *Displays and Printers*.

## 6.1.12 Workstations

The TFDM System workstations **shall** [2071] comply with the HFDS, Chapter 10 *Workplace Design*.

## 6.1.13 Maintainability

The TFDM System maintainer-to-system interfaces **shall** [129] comply with the HFDS, Chapter 4 *Designing Equipment for Maintenance*.

## 6.1.14 Labeling

The TFDM System equipment labeling **shall** [130] comply with the HFDS, Chapter 4.3.5 *Labeling and Marking*.

## 6.2 Employee Safety and Health

### 6.2.1 Environmental, Occupational Safety and Health (EOSH) Requirements

#### 6.2.1.1 Personnel Safety

TFDM, including all COTS equipment, **shall** [450] be in accordance with personnel safety requirements as defined in:

- a. 29 CFR 1910, Occupational Safety and Health Standards (General Industry)
- b. 9 CFR 1926, Safety and Health Regulations for Construction
- c. National Fire Protection Association (NFPA) 70, National Electric Code
- d. NFPA 70E, Standard for Electrical Safety in the Workplace
- e. FAA Order 3900.19, FAA Occupational Safety and Health Program
- f. FAA Standard HF-STD-001, Human Factors Design Standard

#### 6.2.1.2 Project Safety and Health Checklist

The TFDM Program **shall** [451] complete a FAA Pre-Construction and Maintenance Project Safety and Health Checklist that may have EOSH impacts on Air Traffic and Airway Facilities operations.

#### 6.2.1.3 Warning Labels and Placards

The TFDM equipment **shall** [452] be marked with appropriate warning labels or placards, in accordance with 29 CFR 1910.145, Specifications for Accident Prevention Signs and Tags, FAA HF-STD-001, Human Factors Design Standard, Chapter 12.16, Safety Labels and Placards, and American National Standards Institute (ANSI) Z535.4, Product Safety Signs and Labels.

#### 6.2.1.4 Permitting

The TFDM System **shall** [453] obtain or develop required permits to support applicable program activities, including:

- a. Construction and Demolition Permits, in accordance with FAA Order 3900.57, FAA Pre-Construction and Maintenance Project Safety and Health Checklist
- b. Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) Permits, in accordance with 42 USC, Chapter 85, Clean Air Act and 40 CFR, Sections 61.140-61.157, if demolition or renovation activities may disturb asbestos containing material (ACM)
- c. National Pollutant Discharge Elimination System (NPDES) permits, in accordance with the Clean Air Act and 40 CFR 122

#### 6.2.1.5 Plans

The TFDM System **shall** [1653] obtain or develop required plans to support applicable program activities, including:

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- a. Storm Water Pollution Prevention Plans (SWPPP), in accordance with the Clean Water Act, 40 CFR 122, and 40 CFR 123
- b. Spill Prevention, Control, and Countermeasure (SPCC) Plans, in accordance with the Clean Water Act and 40 CFR 112, Oil Pollution Prevention

## 6.2.2 Electrical Safety

### 6.2.2.1 General

The TFDM Program **shall** [454] be in accordance with electrical safety requirements as defined in:

- a. 29 CFR 1910, Subpart S, Electrical
- b. FAA Standard HF-STD-001, Human Factors Design Standard, Chapter 12.4, Electrical Hazards
- c. DOT Specification FAA-G-2100, Electronic Equipment, General Requirements
- d. National Fire Protection Association (NFPA) 70, National Electrical Code
- e. NFPA 70E, Electrical Safety in the Workplace

### 6.2.2.2 Equipment Racks

The TFDM Program **shall** [455] meet clear working space requirements if equipment racks are to be installed, removed, or repositioned during equipment installation in accordance with 29 CFR 1910.303.

### 6.2.2.3 Electrical Equipment Hazard Labeling

TFDM electrical equipment **shall** [456] be marked with labels to indicate any equipment hazard, in accordance with FAA-G-2100, Chapter 3.3.5.5, Markings, Signs, Tags and Symbols.

### 6.2.2.4 Power Distribution

The TFDM Program **shall** [457] meet power distribution requirements in accordance with FAA Order 6950.27, Short Circuit Analysis and Protective Device Coordination Study.

## 6.2.3 Arc Flash

### 6.2.3.1 General

Personnel working on or near TFDM equipment **shall** [458] be protected from arc flash hazards In accordance with NFPA 70E, Electrical Safety in the Workplace, and NFPA 70, National Electric Code®

### 6.2.3.2 Arc Flash Hazard Analysis (AFHA)

The TFDM System **shall** [459] perform an Arc Flash Hazard Analysis on all electrical circuits except those meeting the exceptions criteria described in NFPA 70E, Electrical Safety in the Workplace, Article 130.

### 6.2.3.3 Shock Hazard Analysis

If TFDM equipment will require performance of electrical work on exposed energized conductors or circuit parts, The TFDM System **shall** [460] perform a Shock Hazard Analysis to determine the Limited, Restricted, and Prohibited approach boundaries, in accordance with NFPA 70E, Electrical Safety in the Workplace.

### 6.2.3.4 Circuit Panel Warning Labels

Upon completion of any Arc Flash Hazard Analysis or Shock Hazard Analysis, The TFDM System **shall** [461] mark each affected circuit panel with warning labels meeting the requirements of American National Standards Institute (ANSI) Z53, Series of Standards for Safety Signs and Tags.

## 6.2.4 Hazardous Energy Control

### 6.2.4.1 Lockout/Tagout

The TFDM System **shall** [462] implement lockout/tagout (LOTO) procedures, including de-energization verification, that meet or exceed minimum requirements for controlling hazardous energy during

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installation, service, modification, and maintenance of program equipment, in accordance with 29 CFR 1910.147 and FAA Order 3900.19B, Occupational Safety and Health Program, Chapter 13.

## **6.2.4.2 Lockout**

The TFDM System **shall** [463] be equipped with the capacity for lockout, in accordance with FAA Order 3900.19B, Occupational Safety and Health Program Chapter 13.

## **6.2.5 Fire Life Safety (FLS)**

### **6.2.5.1 General**

The TFDM System **shall** [464] meet Fire Life Safety requirements in accordance with:

- a. 29 CFR 1910, Subpart E, Means of Egress and Subpart L, Fire Protection
- b. FAA Order 3900.19B, FAA Occupational Safety and Health Program, Chapter 24
- c. FAA Standard HF-STD-001, Human Factors Design Standard, Chapter 12.11, Fire Protection
- d. 29 CFR 1960.20, Alternate Standard for Fire Safety in Airport Traffic Control Towers (ATCT)

### **6.2.5.2 Automatic Fire Detection**

Automatic fire detection devices, fire extinguishing Systems and sprinkler Systems in TFDM equipment areas **shall** [465] be installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 101®, Life Safety Code.

### **6.2.5.3 Exits**

Exits in the building or structure where TFDM equipment is housed **shall** [466] be arranged and maintained to provide free and unobstructed egress from all parts of the building/structure at all times when it is occupied, in accordance with in accordance with 29 CFR 1910, Subpart E, Means of Egress.

### **6.2.5.4 Fire Stops**

The TFDM System **shall** [467] ensure that installation of program equipment will not impact building fire stops and/or floor penetration, in accordance with 29 CFR 1910, Subpart L, Fire Protection.

### **6.2.5.5 Occupant Emergency Plans (OEPs)**

The TFDM System **shall** [468] coordinate with Facilities Point of Contact (POC) to ensure that facility OEPs that are affected by program activities or equipment are updated to reflect current conditions, including changes to egress routes or fire life safety procedures, in accordance with 29 CFR 1910 Subpart E, Means of Egress and FAA Order 3900.19B, FAA Occupational Safety and Health Program.

## **6.2.6 Batteries**

### **6.2.6.1 General**

The TFDM System **shall** [469] ensure that storage, use, disposal, and maintenance of backup batteries used in the program equipment package are in accordance with:

- a. FAA Order 3900.19, FAA Occupational Safety and Health Program
- b. FAA Order 6980.25, Maintenance of Batteries for Standby Power
- c. 29 CFR 1926.441, Batteries and Battery Charging
- d. National Fire Protection Association (NFPA) 70, National Electrical Code®, Article 480

### **6.2.6.2 Battery Racks**

The TFDM System **shall** [470] ensure that battery rack parts that directly support the battery(ies) are nonconductive and are electrically insulated with material other than paint (i.e., rubber or rubber coating), in accordance with NFPA 70, National Electrical Code®, Article 480.



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## 6.2.7 Emergency Eyewashes/showers

### 6.2.7.1 General

- a. The TFDM System **shall** [471] provide emergency eyewash and shower equipment for immediate emergency use in any work area where the eyes or body of any person may be exposed to injurious corrosive materials, in accordance with: 29 CFR 1910.151, Medical Services and First Aid; FAA Order 6980.25, Maintenance of Batteries for Standby Power; ANSI Z358.1, American National Standard for Emergency Eye Wash and Shower Equipment

### 6.2.7.2 Eyewash/Shower Location

Eyewash/shower equipment in TFDM work areas **shall** [472] be located within 10 seconds of walking distance to the hazard, on the same level as the hazard, and **shall** be identified with highly visible markings, in accordance with ANSI Z358.1, American National Standard for Emergency Eye Wash and Shower Equipment.

### 6.2.7.3 Eyewash/showers Proximity to Electrical Equipment

The TFDM System **shall** [473] ensure that eyewash/shower equipment installed in electrical rooms is placed in locations where the eyewash/shower water spray will not impact electrical equipment, in accordance with FAA Order 6980.25, Maintenance of Batteries for Standby Power.

## 6.2.8 Material Handling

### 6.2.8.1 General

- a. TFDM material handling equipment **shall** [474] be in accordance with: FAA Order 3900.19B, FAA Occupational Safety and Health Program; FAA Standard HF-STD-001, Human Factors Design Standard; 29 CFR 1910, Occupational Safety and Health Standards (General Industry), Subpart N, Materials Handling and Storage

### 6.2.8.2 Floor Loading Limits

TFDM Program **shall** [475] ensure that program equipment does not exceed floor loading limits in FAA buildings or structures where the equipment will be installed, transported or stored, in accordance with 29 CFR 1910.22.

### 6.2.8.3 Line Replaceable Unit (LRU) Weight

TFDM Program **shall** [476] ensure that a label is affixed to any line replaceable unit (LRU) weighing 37 pounds or greater that indicates its weight, center of gravity, and the number of people recommended to lift or carry the LRU, in accordance with FAA Standard HF-STD-001, Human Factors Design Standard.

## 6.2.9 Indoor Air Quality

The TFDM System **shall** [477] not adversely impact indoor air quality (IAQ) at FAA facilities, in accordance with:

- a. FAA Order 3900.19B, FAA Occupational Safety and Health Program
- b. U.S. Environmental Protection Agency (EPA) primary and secondary standards

### 6.2.10 Non-FAA Facilities

The TFDM System **shall** [478] ensure that non-FAA facilities containing program equipment that must be maintained by FAA personnel are in compliance with:

- a. 29 CFR 1910, Occupational Safety and Health Standards (General Industry)
- b. 29 CFR 1926, Safety and Health Regulations for Construction
- c. FAA Order 3900.19B, FAA Occupational and Health Program
- d. FAA Standard HF-STD-001, Human Factors Design Standard
- e. National Fire Protection Association (NFPA) 70, National Electrical Code, and NFPA 70E, Electrical Safety in the Workplace



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- f. Relevant fire codes and building codes

## 6.2.11 Personal Protective Equipment (PPE)

### 6.2.11.1 General

The TFDM System **shall** [479] provide PPE to FAA personnel whenever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants, in accordance with:

- a. 29 CFR 1910, Subpart I, Personal Protective Equipment
- b. FAA Order 3900.19B, FAA Occupational Safety and Health Program, Chapter 25

### 6.2.11.2 Job Hazard Analysis (JHA)

The TFDM System **shall** [480] evaluate an installation plan to identify PPE requirements in accordance with FAA Order 3900.19B, FAA Occupational Safety and Health Program, Chapter 23.

## 6.3 Specialized Skills and Capabilities

### 6.3.1 General

The TFDM System **shall** [132] be operable and maintainable by the current work force, as verified by a Task and Skills Analysis.

### 6.3.2 Workload

The TFDM System operator and maintainer cognitive and physical workloads **shall** [133] comply with the HFDS, Section 3.1.11 *Avoid Extreme Workload Levels* and Section 3.1.10 *Avoid Increasing Demands for Cognitive Resources*.

### 6.3.3 Staffing

The TFDM System staffing levels **shall** [134] determined by a personnel staffing analysis.

### 6.3.4 Training

The TFDM System **shall** [135] comply with the HFDS, Section 3.1.24 *Make Systems Easy to Learn* and Section 3.10 *Training*.

## 6.4 Accessibility Compliance

### 6.4.1 General

The TFDM System **shall** [136] be in accordance with FED-STD-795, “Uniform Federal Accessibility Standard (UFAS).”

### 6.4.2 Section 508

The TFDM System's routine administrative and business **shall** [137] be in accordance with 36 CFR 1194, “Electronics and Information Technology Accessibility Standard”, which implements Section 508 of the *Rehabilitation Act of 1973*, as amended (29 CFR 794d).

## 7 Security {Core}

### 7.1 Information Systems Security (ISS)

#### 7.1.1 Air Traffic Organization Information Systems Security Policy

The TFDM Program **shall** [1950] comply with the FAA Order 1370.82, ISS Program Policy

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## 7.1.2 National Airspace System Information Systems Security

The TFDM Program **shall** [1951] implement ISS requirements in accordance with NAS-RD-2010, NAS Requirements Document.

## 7.1.3 Air Traffic Organization Information Systems Security Minimum Security Requirements Implementation

The TFDM Program **shall** [1952] implement ATO-tailored National Institute of Standards and Technology (NIST) Special Publication (SP) 800-53, ISS requirements commensurate with the TFDM security categorization for all TFDM information that is collected, stored, processed, disseminated, or transmitted as required by the following:

- a. Public Law 100-235, Federal Information Security Management Act, 2002 (FISMA));
- b. The Office of Management and Budget (OMB) Circular A-130, Management of Federal Information Resources;
- c. U.S. Department of Transportation (DOT) Handbook, Department of Transportation H 1350.2, Departmental Information Resources Management Manual (DIRMM),.
- d. Office of Management and Budget (OMB) Circular Number A130, Management of Federal Information Resources, November 28, 2000,
- e. FAA Order 1200.22, External Request for NAS Data
- f. Homeland Security Presidential Directive Number 12 (HSPD-12), Policy for a Common Identification Standard for Federal Employees and Contractors, and
- g. NIST 800-64, Security Considerations in the System Development Life Cycle, Rev 2

## 7.1.4 Access Control

### 7.1.4.1 Limit Access

The TFDM System **shall** [1953] implement access control technical (logical), administrative, and physical controls to limit access to authorized TFDM users.

### 7.1.4.2 Logical Access Controls

The TFDM **shall** [1954] implement logical access controls in accordance with the Office of Management and Budget Memorandum 11-11: Continued Implementation of Homeland Security Presidential Directive (HSPD) 12– Policy for a Common Identification Standard for Federal Employees and Contractors.

### 7.1.4.3 Warning Banner

The TFDM Program **shall** [1955] implement FAA Order 1370.102, System Use Notification & Disclaimer Statement Policy

### 7.1.4.4 Privileged Function Identification

The TFDM System **shall** [1956] document authorized privileged functions (e.g., configuring access privileges, setting events to be audited, setting intrusion detection parameters) that can be accessed remotely.

### 7.1.4.5 User Account Types

The TFDM Program **shall** [1957] identify the TFDM System operating system and application account types for all TFDM System assets.

### 7.1.4.6 Authorized Users Assigned Minimum Privileges

The TFDM Program **shall** [1958] only assign privileges to individual authorized users or authorized groups necessary to perform assigned TFDM System functions.

### 7.1.4.7 Authorized Users Functions

The TFDM Program **shall** [1959] separate TFDM System privileged functions from non-privileged functions.

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## 7.1.5 Audit and Accountability

### 7.1.5.1 Audit and Accountability Information Systems Security Requirements

The TFDM Program **shall** [1960] implement audit and accountability ISS requirements in accordance with the tailored ATO National Institute of Standards and Technology Special Publication 800-53, rev 3 requirements

### 7.1.5.2 Audit Records

The TFDM System **shall** [1961] record TBD selected system, network, application, and user security-relevant activities.

### 7.1.5.3 Analysis of Audit Records

The TFDM Program **shall** [1962] design tools to automate the analysis of audit records.

### 7.1.5.4 Protect Audit Records

The TFDM System **shall** [1963] protect the integrity of security-relevant audit records.

## 7.1.6 Awareness and Training

### 7.1.6.1 Role-Based Information Systems Security Training

The TFDM Program **shall** [1964] provide role-based security-related training and document training:

- a. Before authorizing access to the TFDM System or performing assigned duties or
- b. When required by TFDM System changes in accordance with 1370.82

### 7.1.6.2 Information Systems Security Training Records

The TFDM Program **shall** [1965] document and record security-related training.

## 7.1.7 Audit and Accountability

### 7.1.7.1 Audit and Accountability Information Systems Security Requirements

The TFDM Program **shall** [1966] implement audit and accountability ISS requirements in accordance with the tailored ATO National Institute of Standards and Technology Special Publication 800-53, rev 3 requirements

## 7.1.8 Configuration Management

### 7.1.8.1 Configuration Settings

The TFDM Program **shall** [1967] configure TFDM assets in accordance with National Institute Standards and Technology Special Publication 800-70, National Checklist Program for IT Products--Guidelines for Checklist Users and Developers.

## 7.1.9 Contingency Planning

### 7.1.9.1 Recovery Procedures

The TFDM Program **shall** [1969] develop recovery procedures to restore the TFDM System to a known state after a disruption, compromise, or failure.

### 7.1.9.2 Record Test Recovery Results

The TFDM Program **shall** [1970] test recovery procedures on an annual basis and before System authorization.

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## **7.1.9.3 Test Recovery Procedures**

The TFDM Program **shall** [1971] record test recovery results.

## **7.1.10 Identification and Authentication**

### **7.1.10.1 Unique Identification**

The TFDM System **shall** [1972] uniquely identify authorized TFDM System users for selected tasks, including Air Traffic Controllers and TFDM functions that can be performed without identification or authentication.

### **7.1.10.2 Privileged User Authentication**

The TFDM System **shall** [1973] authenticate privileged TFDM users.

### **7.1.10.3 Two-Factor Authentication**

The TFDM System **shall** [1974] require two-factor authentication to verify the identification of TFDM authorized users.

## **7.1.11 Incident Response**

### **7.1.11.1 Develop Incident Response and Handling Procedures**

The TFDM Program **shall** [1975] develop incident response and handling procedures in accordance with FAA Order 1370.101, Information Security Incident Reporting and Response Policy.

### **7.1.11.2 Implement Incident Response and Handling Procedures**

The TFDM Program **shall** [1976] implement incident response and handling procedures in accordance with FAA Order 1370.101, Information Security Incident Reporting and Response Policy.

### **7.1.11.3 Record Incident Response Procedures**

The TFDM Program **shall** [1977] record possible security incidents in accordance with FAA Order 1370.101, Information Security Incident Reporting and Response Policy.

### **7.1.11.4 Report Incident Response Procedures**

The TFDM users **shall** [1978] report suspicious security activity to the TFDM incident-response Point of Contact.

## **7.1.12 Maintenance**

### **7.1.12.1 Maintenance Support**

The TFDM Program **shall** [1979] require maintenance personnel to maintain the security settings of TFDM System assets.

## **7.1.13 Media Protection**

### **7.1.13.1 Media Access Restrictions**

The TFDM Program **shall** [1980] restrict access to media, including media containing Sensitive Unclassified Information (SUI), as defined by *FAA Order 1600.75, Protecting Sensitive Unclassified Information (SUI)*.

### **7.1.13.2 Media Transport**

The TFDM Program **shall** [1981] protect media during transportation in accordance with FAA Order 1600.75, Protecting Sensitive Unclassified Information (SUI).

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## **7.1.13.3 Media Sanitization**

TFDM Program **shall** [1982] sanitize media in accordance with FAA Order 1370.100, Media Sanitizing and Destruction Policy.

## **7.1.13.4 Media Destruction**

TFDM Program **shall** [1983] destroy media in accordance with FAA Order 1370.100, Media Sanitizing and Destruction Policy.

## **7.1.13.5 Media Sanitization and Destruction Record**

TFDM Program **shall** [1984] record destruction or sanitization of media in accordance with FAA Order 1370.100, Media Sanitizing and Destruction Policy.

## **7.1.14 Personnel Security**

### **7.1.14.1 Personnel Security Policy and Procedures**

The TFDM Program **shall** [1985] implement personnel security policies and procedures in accordance with the following:

- a. FAA Order 1600.1, Personnel Security Program
- b. FAA Order 1600.72, Contractor and Industrial Security Program
- c. FAA Order JO 1370.96, ATO System Access Control

### **7.1.14.2 Validate Position Eligibility**

The TFDM System **shall** [592] validate the TFDM position specific user eligibility for inputting messages from users.

## **7.1.15 Physical and Environmental Protection**

### **7.1.15.1 Write Physical and Environmental Protection Policy and Procedures**

The TFDM Program **shall** [1986] develop physical and environmental protection procedures to protect TFDM System assets, including documentation, throughout the life cycle in accordance with the following FAA Orders:

- a. FAA Order 1600.6, Facility Security Policy
- b. FAA Order 1600.69, Facility Management Program

### **7.1.15.2 Dissemination of Physical and Environment Protection Procedures**

The TFDM Program **shall** [1987] disseminate physical and environmental protection procedures to protect TFDM System assets, including documentation, throughout the life cycle in accordance with the following FAA Orders:

- a. FAA Order 1600.6, Facility Security Policy
- b. FAA Order 1600.69, Facility Management Program

## **7.1.16 Planning**

### **7.1.16.1 Create Information Systems Security Documentation**

The TFDM Program **shall** [1988] write Information Systems Security documents required for approving the TFDM System to operate.

### **7.1.16.2 Deliver Information Systems Security Documentation**

The TFDM Program **shall** [1989] deliver Information Systems Security documents required for approving the TFDM System to operate to the Air Traffic Organization Information Systems Security Program Office.

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## **7.1.17 Risk Assessment**

### **7.1.17.1 Security Categorization**

The TFDM Program **shall** [1990] conduct an analysis to define the security categorization of the TFDM System using the Federal Information Processing Standards (FIPS) 199, Standards for Security Categorization of Federal Information and Information Systems.

### **7.1.17.2 Remediate Security Vulnerabilities**

The TFDM Program **shall** [1991] remediate security vulnerabilities required for the TFDM System to be approved to operate within the National Airspace System.

## **7.1.18 System and Services Acquisition**

### **7.1.18.1 System and Services Acquisition Policy**

The TFDM Program **shall** [1992] implement National Airspace System Air Traffic Organization Information Systems Security requirements in accordance with Federal Information Processing Standards (FIPS) Publication 200, Minimum Security Requirements for Federal Information and Information Systems and the TFDM System security categorization.

### **7.1.18.2 Information Systems Security Activity Planning**

The TFDM Program **shall** [1993] incorporate Information Systems Security activities in the TFDM Program System Development Life Cycle in accordance with National Institute of Standards and Technology Special Publication 800-64, Revision 2, Security Considerations in the System Development Life Cycle, October 2008.

## **7.1.19 Security Assessment and Authorization**

### **7.1.19.1 Security Assessment and Authorization Support**

The TFDM Program **shall** [1995] provide documentation of the TFDM System implementation of Information Systems Security requirements to the assessment and authorization of the System.

## **7.1.20 System and Communication Protection**

### **7.1.20.1 System and Communication Protection Policy and Procedures**

The TFDM Program **shall** [1996] implement system and communication policies, procedures, and security controls in accordance with

- a. FAA Order 1370.79, Internet Use Policy,
- b. FAA Order 1370.83, Internet Access Points,
- c. FAA Order 1370.84, Internet Services,
- d. DOT H 1350.251, Network Security Guide

## **7.1.21 System and Information Integrity**

### **7.1.21.1 Functional and Data Integrity**

The TFDM Program **shall** [1997] implement security mechanisms and procedures to protect the functional and data integrity of the TFDM System and TFDM data.

### **7.1.21.2 Security Flaw Remediation**

The TFDM Program **shall** [1998] implement a systematic, accountable, and documented process for identifying, reporting and correcting the TFDM System security flaws (e.g., flaws in software systems, system architectural configuration, and configuration settings) in accordance with the following:

- a. FAA Order 1370.9, Information Systems Security Patch Management,

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- b. FAA Order 1370.99, Air Traffic Organization National Airspace System Information Systems Security Patch Management, and
- c. FAA Order 1800.66, Configuration Management Policy

## 7.1.22 Program Management

### 7.1.22.1 Plan of Action and Milestones (POA&M)

The TFDM Program **shall** [1999] maintain the list of nonmitigated security flaws identified by the ATO Information Systems Security Independent Risk Assessment Team in the POA&M.

### 7.1.22.2 Information Systems Security Risk Mitigation

The TFDM Program **shall** [2000] remediate the POA&M.

## 8 In-Service Support {Core}

### 8.1 Integrated Logistics Support

#### 8.1.1 Integrated Logistics Support Plan

The TFDM Program **shall** [161] develop an Integrated Logistics Support Plan (ILSP) in accordance with FAA Acquisition Management System (AMS) Section 4.3 and related guidance.

### 8.2 Staffing

#### 8.2.1 Support Staffing

The TFDM System staffing **shall** [162] comply with FAA Order 3000.57, “Air Traffic Organization Technical Operations Training and Certification Program”.

#### 8.2.2 Site Human Resource Requirements

The TFDM System operation and maintenance resources **shall** [164] TBD until after the alternative is selected.

#### 8.2.3 Off-Site Human Resource Requirements

The TFDM System second-level support resources **shall** [165] TBD until after the alternative is selected.

### 8.3 Supply Support

#### 8.3.1 Delivered Spares

The TFDM Program **shall** [166] deliver initial site and depot spares required to facilitate repair and restoration.

#### 8.3.2 Provisioning

The TFDM Program **shall** [168] comply with FAA Order 4650.1, “Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Material”, substituting MIL-PRF-49506, “Logistics Management Information (LMI)” for Logistic Support Analysis (LSA).

#### 8.3.3 Sparing Model

The TFDM Program **shall** [169] use a sparing model for each unique system configuration.

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## 8.4 Support Equipment

### 8.4.1 Site Tools and Test Equipment

The TFDM Program **shall** [171] deliver Tools and Test equipment required to support TFDM operations and maintenance in accordance with FAA Order 6200.4, “Test Equipment Management Handbook” and MIL-PRF-49506 “Logistics Management Information (LMI)”.

### 8.4.2 Tools and Test Equipment

The TFDM Program **shall** [172] deliver Tools and Test equipment required to support TFDM operations and maintenance in accordance with FAA Order 4250.9, “Field Material Management Control”.

## 8.5 Technical Data

### 8.5.1 Technical Instruction Manuals

The TFDM Program **shall** [173] deliver Technical Instruction Manuals for System maintenance and operations and for all levels of FAA maintenance and operations, including the use of an Interactive Electronic Technical Manual (IETM)

### 8.5.2 Preparation of Technical Instruction Manuals

The TFDM Program **shall** [174] deliver manuals and technical instructions in accordance with FAA Order FAA-D-2494, “Technical Instruction Book Manuscript: Electronic, Electrical and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Book”.

### 8.5.3 Approval of Technical Instruction Books (TIBs)

The TFDM Program **shall** [175] deliver approved TIBs and baselined through the FAA CM process.

### 8.5.4 Delivery of Manuals

The TFDM Program **shall** [176] deliver manuals and applicable COTS documentation to each site electronically and in hardcopy prior to equipment installation.

### 8.5.5 Veracity of TIBs

The TFDM Program **shall** [177] deliver TIBs that reflect the as-accepted configuration of the TFDM System.

### 8.5.6 Second-Level Hardware and Software Maintenance Documentation

TFDM Program **shall** [178] deliver Second-level hardware and software maintenance documentation to the operational support organization prior to deployment of the TFDM System.

### 8.5.7 Re-procurement Data Package Option

The TFDM Program **shall** [179] deliver the TFDM System Re-procurement Data Package to ensure the FAA’s ability to acquire replacement equipment.

### 8.5.8 Drawings and Specifications

The TFDM Program **shall** [180] deliver the drawings and specifications in accordance with MIL-T-31000, “Technical Data Package Specifications”.

## 8.6 Training and Training Support

### 8.6.1 Contractor Training

The TFDM Program **shall** [181] deliver training in accordance with FAA-STD-028, “Contract Training programs” (as modified by the Government) to provide FAA personnel the knowledge and skills to operate, maintain and monitor the System.



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## **8.6.2 Curriculum in Advance**

The TFDM Program **shall** [182] deliver the Air Traffic Organization (ATO) personnel training curriculum in advance to allow for evaluation of the curriculum.

## **8.6.3 Training Packages Delivery**

The TFDM Program **shall** [183] deliver complete training packages to the FAA Academy for development of operations, maintenance, and System administration trainings.

## **8.6.4 Air Traffic Controller Training**

### **8.6.4.1 Air Traffic (AT) Training Program**

The TFDM Program **shall** [184] develop an air traffic training program to provide AT personnel the knowledge and skill sets needed to use the TFDM System.

### **8.6.4.2 Air Traffic Training Courses**

The TFDM Program **shall** [185] deliver air traffic training courses that comply with FAA Order 3000.22, “Air Traffic Service Training”.

### **8.6.4.3 Air Traffic Training Content**

The TFDM Program **shall** [186] deliver AT training to include:

- a. Equipment Operation
- b. CHI
- c. AT Operational Functionality and Procedures

### **8.6.4.4 Performance Examinations**

The TFDM Program **shall** [187] develop performance examinations for AT specialist certification on the TFDM System.

## **8.6.5 Technical Operations Training**

### **8.6.5.1 Technical Operations Training Development**

The TFDM Program **shall** [188] develop a technical operations training program designed to:

- a. Support the maintenance concept
- b. Address certification

### **8.6.5.2 Technical Operations Training**

The TFDM Program **shall** [189] train the Technical Operations specialists with the knowledge, skills, and abilities to:

- a. Operate
- b. Maintain
- c. Certify

the TFDM System and equipment.

### **8.6.5.3 Technical Operations Training Courses**

The TFDM Program technical Operations training courses **shall** [190] comply with FAA Order 3000.57, “Air Traffic Organization Technical Operations Training and Personnel Certification programs.”

### **8.6.5.4 Technical Operations Training Content**

The TFDM Program **shall** [191] develop Technical Operations training content to include:

- a. Operation of Test Tools
- b. Operation of Test Equipment

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## c. Peripheral Interfaces/Inputs

### 8.6.5.5 Performance Examinations

The TFDM Program **shall** [192] develop performance examinations for Technical Operations specialist certification on the TFDM System.

### 8.6.6 Second Level Engineering Training

The TFDM Program **shall** [193] develop second-level engineering training program to provide Government engineers/technicians the skills and knowledge required to perform second-level hardware and software maintenance on TFDM.

### 8.6.7 System Administrator and Security Administrator Training

The TFDM Program **shall** [194] develop System Administrator and Security Administrator training programs to provide the knowledge and skills required to perform system administrative functions.

### 8.6.8 Depot Training

The TFDM Program **shall** [195] develop depot level repair training for depot repairable items in TFDM. TBD after the alternative is selected

## 8.7 First and Second Level Repair

### 8.7.1 Maintenance Policy

The TFDM System Maintenance **shall** [196] comply with FAA Order 6000.30, "National Airspace System Maintenance Policy" and FAA Order 6000.15, "General Maintenance Handbook for National Airspace System (NAS) Facilities".

### 8.7.2 Second Level Support

The TFDM System Second-level engineering support **shall** [197] comply with FAA Order 6000.30, "National Airspace System Maintenance Policy" and FAA Order 6000.15, "General Maintenance Handbook for National Airspace System Facilities."

### 8.7.3 Contractor Assisted Maintenance and Support

The TFDM System contractor assisted maintenance and support **shall** [198] comply with FAA Order 6000.41, "Policy Governing Contractor-Assisted Maintenance for the National Airspace System."

### 8.7.4 Maintenance at Government Acceptance

The TFDM Program **shall** [199] deliver system maintenance and logistics support at government acceptance for each site.

## 8.8 Depot Support

### 8.8.1 Depot Level Maintenance

TFDM System Depot level maintenance **shall** [200] consist of repairing or contracting repair of failed LRUs that are shipped from a site and work center.

### 8.8.2 Custom Developed Hardware

The TFDM Program **shall** [201] treat any custom developed hardware as follows:

- a. A Developmental Item
- b. Be provisioned
- c. Be a Candidate for Depot Repair

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## 8.8.3 Vendor Repair Contracts

The FAALC **shall** [202] manage all vendor repair contracts for system equipment.

## 8.9 Packaging, Handling, Storage, and Transportation

### 8.9.1 Packaging, Handling, Storage, and Transportation Policy

TFDM System packaging, handling, storage, and transportation **shall** [203] comply with:

- a. FAA Order 4770.3, "Transportation and Traffic Management of Government Property and Household Goods"
- b. American Society for Testing and Materials (ASTM)-D3951, "Standard Practice for Commercial Packaging" and MIL-STD-129, "Marking for Shipping and Storage, Quality and Format Specification"
- c. MIL-STD-2073-1, "DOD Material Procedures for Development and Application of Packaging Requirements".

### 8.9.2 Disposal

#### 8.9.2.1 Disposal Plan

The TFDM Program Disposal Plan **shall** [204] comply with FAA Order 4600.27 "Personal Property Management".

#### 8.9.2.2 Disposal Plan Coordination

The TFDM Program **shall** [205] coordinate the Disposal Plan with the NAS Logistics Property Management Division.

### 8.9.3 Bar Coding

#### 8.9.3.1 FAA Owned Equipment

The TFDM Program hardware bar coding **shall** [206] comply with the FAA Asset Identification Process and Procedure Guide and UCC/EAM 128, "Asset Supply Chain Management".

### 8.9.4 Facility Codes

#### 8.9.4.1 Code Assignment

TFDM System **shall** [208] have a facility identification code in accordance with FAA Order 6000.5, "Facility, Service and Equipment Profile (FSEP)".

#### 8.9.4.2 System Profiles

The TFDM System **shall** [209] have a profile in the FSEP.

#### 8.9.4.3 FRDF Information Dissemination

TFDM Program **shall** [210] complete and disseminate Facility Reference Data File (FRDF) information in accordance with FAA Order 6000.15 General Maintenance Handbook for National Airspace System (NAS) Facilities".

### 8.9.5 Project Material Management

#### 8.9.5.1 System Facilities and Equipment Material Management

TFDM Program facilities and equipment material management **shall** [211] comply with FAA Order 4600.27, "Personal Property Management.

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## 8.9.5.2 System Project Material Management

TFDM System project material management **shall** [212] comply with FAA Order 4140.1, “Integrated Material Management Program”.

## 8.9.5.3 National Stock Numbers

TFDM equipment and material National Stock Numbers **shall** [213] comply with FAA Order 4500.3, “Federal Catalog and Standardization Programs”.

## 8.9.5.4 Contractor Depot Inventories

TFDM Program **shall** [214] maintain Contractor depot inventories of operating material in accordance with FAA Order 4630.1, “Management of Depot Inventories of Operating Material”.

## 8.9.5.5 Inventory of System Material

TFDM System material inventory **shall** [215] comply with FAA Order 4633.1, “Physical Inventory”.

## 8.9.5.6 Removal from Inventory

TFDM Program **shall** [216] remove lost, damaged, misplaced, and destroyed material in accordance with FAA Order 4600.27, “Personal Property Management”.

## 8.9.6 Warranty

TFDM System Warranty items **shall** [217] comply with FAA Order 4650.20, “Reporting and Replacement of Items Falling Under Warranty”.

## 8.9.7 Certification

### 8.9.7.1 Service and System Certification Criteria

TFDM System certification criteria **shall** [218] comply with in FAA Order 6000.15, “General Maintenance Handbook for NAS Facilities”.

## 9 Test and Evaluation {Core}

### 9.1 Critical Operational Issues (COIs)

#### 9.1.1 List of COI's

##### 9.1.1.1 COIs

Testing **shall** [1172] be conducted to resolve the following COIs:

COI 1 - Does TFDM interface and operate with existing equipment and Systems?

COI 2 - Can TFDM be used without disruption or degradation to ATC operations?

COI 3 - Does TFDM provide the required level of reliability, maintainability and availability?

COI 4 - Can TFDM be maintained without disrupting or degrading current ATC operations?

COI 5 - Do TFDM procedures and human-System designs for ATC and technical operations support safe and effective operations for the users?

COI 6 - Is sufficient training provided for ATO to effectively operate TFDM?

#### 9.1.2 Critical Operational Issues Testing

##### 9.1.2.1 Operational Testing of COIs

Operational testing **shall** [1173] encompass all six COIs identified above.

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## 9.1.2.2 Functional Performance

TFDM Program **shall** [1174] conduct testing to ensure that functional performance requirements can be met in an operational environment.

## 9.1.2.3 ATC Operations

The TFDM Program **shall** [220] conduct tests to ensure TFDM can safely support ATC operations and procedures.

## 9.1.2.4 Traffic Flow Operations

The TFDM Program **shall** [221] conduct tests to ensure TFDM can provide safe, orderly and expeditious flow of traffic.

## 9.2 Test and Evaluation Requirements

### 9.2.1 System Tests

The TFDM System **shall** [222] include the following test:

- a. Hardware and Software Qualification Tests
- b. Factory Acceptance Tests (FAT)
- c. Systems Tests
- d. Operational Test & Evaluation (OT&E)
- e. Key Site Test
- f. Site Acceptance Test (SAT)

### 9.2.2 Operational Test and Evaluation

TFDM Program **shall** [1176] conduct testing and evaluation at FAA William J. Hughes Technical Center (WJHTC) before testing at an operational site to ensure compliance with NAS operational and qualification requirements.

### 9.2.3 Independent Operational Assessment (IOA)

TFDM Program **shall** [1177] conduct IOA with operations and maintenance representatives to verify operational environment, effectiveness and suitability of TFDM.

## 10 Implementation and Transition {Core}

### 10.1 Program Implementation Planning

#### 10.1.1 General

##### 10.1.1.1 Implementation Planning

The TFDM Program Implementation Planning **shall** [1179] comply with the AMS policy and guidance.

##### 10.1.1.2 In-Service Review (ISR)

The TFDM Program **shall** [1180] complete the ISR Checklist to assess operational readiness and suitability prior to deploying the TFDM System to additional sites.

##### 10.1.1.3 Tailored ISR

The TFDM Program **shall** [1181] use the tailored ISR Checklist to assess operational readiness and suitability prior to deploying TFDM.

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## **10.1.2 Project Implementation Plan (PIP)**

### **10.1.2.1 Prepare Site Activities**

The TFDM Program **shall** [1182] develop a PIP consisting delivery, installation, integration and testing activities to prepare the site for TFDM operations into the NAS.

### **10.1.2.2 Commission Activities**

TFDM Program **shall** [1187] include in the PIP the activities required to commission TFDM into NAS operations.

### **10.1.2.3 Operational Capability**

TFDM Program **shall** [1189] include procedures in the PIP to maintain ATC operational capability during TFDM implementation activities.

## **10.1.3 Site Surveys**

### **10.1.3.1 Modification to Space**

TFDM Program **shall** [1190] conduct site surveys to determine modifications to assigned space and other site preparations for the integration of TFDM into facility.

### **10.1.3.2 Testing & Transition**

TFDM Program Site survey **shall** [1194] identify space for TFDM operational testing and transition.

## **10.1.4 Site Preparation**

### **10.1.4.1 Generic Site Implementation Plan (GSIP)**

TFDM Program **shall** [1195] develop a GSIP.

### **10.1.4.2 Planning**

TFDM Program **shall** [1196] allow field facility and personnel to plan site preparation activities.

### **10.1.4.3 Scheduling**

TFDM Program **shall** [1197] allow field facility and personnel to schedule site preparation activities.

### **10.1.4.4 Management**

TFDM Program **shall** [1198] allow field facility and personnel to manage site preparation activities.

## **10.1.5 Facility Modifications**

### **10.1.5.1 Plan**

The FAA **shall** [1200] plan site-specific facility modifications.

### **10.1.5.2 Schedule**

The FAA **shall** [1201] schedule site-specific facility modifications.

## **10.1.6 Equipment Delivery**

### **10.1.6.1 Personnel**

TFDM Program equipment delivery **shall** [1207] ensure that personnel are available to accept deliveries at established times.

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## 10.1.6.2 Site Installation Plan (SIP)

The TFDM Program **shall** [227] develop a SIP for each site.

## 10.1.7 Power-up Test and Compatibility

### 10.1.7.1 Power-Up Testing

TFDM Program **shall** [1213] conduct Initial power-up testing, except on operationally active critical power.

### 10.1.7.2 Power Compatibility

TFDM Program **shall** [1214] test TFDM equipment for power compatibility prior to connection to FAA critical power panels.

## 10.2 Infrastructure Implementation

### 10.2.1 Integration

#### 10.2.1.1 Facilities

TFDM Program **shall** [1216] develop an integration strategy for the Facility.

#### 10.2.1.2 Facility Equipment

The integration strategy **shall** [1217] cover facility equipment impacts.

#### 10.2.1.3 Space Impacts

The integration strategy **shall** [1218] cover space impacts.

#### 10.2.1.4 Operational Impacts

The integration strategy **shall** [1219] cover operations impacts.

#### 10.2.1.5 Personnel Impacts

The integration strategy **shall** [1220] cover personnel impacts.

#### 10.2.1.6 Operations Procedures

The integration strategy **shall** [1223] cover operations procedures.

#### 10.2.1.7 Personnel Procedures

The integration strategy **shall** [1224] cover personnel procedures.

#### 10.2.1.8 ATC Operations

The integration strategy **shall** [1225] maintain ATC operational capability during integration.

#### 10.2.1.9 Continuity of ATC Services

The integration strategy **shall** [1227] allow continuity of full ATC services.

#### 10.2.1.10 Acceptance Testing

The integration strategy **shall** [1229] allow for the acceptance testing of TFDM.

#### 10.2.1.11 Procedures for Physical Integration

The integration strategy **shall** [1231] have procedures for the physical integration of TFDM into the NAS.

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## **10.2.1.12 Consent Authority**

FAA site personnel **shall** [1234] have consent authority over site-specific System integration issues.

## **10.3 Transition**

### **10.3.1 Transitioning Between Systems**

The TFDM Program **shall** [1235] develop a transition plan that includes procedures for transitioning between systems, elements and components, fallback and maintain on-going ATC operations.

### **10.3.2 Fallback Procedure**

The transition plan **shall** [1236] include a fallback procedure.

### **10.3.3 Facility Equipment**

A transition plan **shall** [1237] identify impacts to facility equipment and procedures.

### **10.3.4 Space Impacts**

A transition plan **shall** [1238] identify impacts to space.

### **10.3.5 Operations Impacts**

A transition plan **shall** [1239] identify impacts to operations.

### **10.3.6 Personnel Impacts**

A transition plan **shall** [1240] identify impacts to personnel.

### **10.3.7 Maintain ATC Operations**

The transition plan **shall** [1241] ensure that the transition maintains ATC operations.

## **10.4 ATC Facilities Interface**

### **10.4.1 Interface to ATC Facilities**

The TFDM System **shall** [1250] interface with all appropriate ATC facilities regardless of the transition state of each site.

### **10.4.2 Interface with Facility Legacy Systems**

The TFDM System **shall** [1251] interface with all appropriate ATC facilities regardless of the facility legacy System.

## **11 Quality Assurance (QA) {Core}**

### **11.1 Quality Standards**

The TFDM System **shall** [228] develop a quality assurance plan in accordance with the following:

- a. FAA Order JO 7210.6, Air Traffic Quality Assurance Program
- b. FAA Order JO 7210.9, Quality Assurance Order
- c. FAA-STD-013D - Quality Control Program Requirements
- d. FAA-STD-016A - Quality Control System Requirements



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## 12 Configuration Management (CM) {Core}

### 12.1 CM Policies

#### 12.1.1 Configuration Development

The TFDM Program **shall** [229] develop a CM plan in accordance with:

- a. FAA Order 1800.66 - Configuration Management Policy
- b. FAA-STD-021A - Configuration Management
- c. FAA-STD-058 - Facility Configuration Management

#### 12.1.2 Configuration Implementation

The TFDM Program CM **shall** [230] be applied to all aspects of the fielded systems, including Software, Hardware, Facilities, Documentation, Site Adaptation Data, Interfaces, and Tools.

## 13 In-Service Management {Core}

### 13.1 Performance Plan

The TFDM Program **shall** [231] develop a System Performance Evaluation Plan in the design and testing phases of the program.

### 13.2 Performance Monitoring

#### 13.2.1 Performance Measurement

The TFDM Program **shall** [1690] establish a system performance measurement process for TFDM

#### 13.2.2 System Performance

TFDM System performance **shall** [1691] comply with FAA Order 6000.30, NAS Airspace System Maintenance Policy.

#### 13.2.3 Operations Performance

TFDM operations performance **shall** [1692] comply with NAS, NextGen and Facility Operations requirements. *TBD - additional research needed on Operations Performance requirement.*

## 14 System Safety Management {Core}

### 14.1 General

TFDM Program **shall** [232] conduct safety assessments in accordance with the *Safety Management System (SMS) Manual v2.1*, and ATO-S 2008-12 Version 1.5, *FAA Safety Risk Management Guidance for System Acquisitions (SRMGSA)*.

### 14.2 Program Safety Plan

The TFDM Program **shall** [335] develop a Program Safety Plan (PSP) in accordance with the SRMGSA for the Final Investment decision (FID).

### 14.3 Risk Acceptance and Safety Risk Management Documentation Approval

The TFDM Program **shall** [336] conduct Program Risk Acceptance and Documentation Approval procedures as required by FAA Order JO 1000.37 (*ATO Safety Management System*) and in accordance with the SMS Manual and SRMGSA.

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## APPENDIX I: Acronyms

AAR	Airport Arrival Rate
AC	Airport Configuration DST
ACE-IDS	ASOS Controller Equipment (ACE)/Information Display System (IDS)
ACM	Asbestos Containing Material
ACS	Aeronautical Common Services
ADL	Aggregate Demand List
ADR	Airport Departure Rate
ADS-B	Automatic Dependent Surveillance - Broadcast
ADU	Audio Distribution Unit
AEFS	Advanced Electronic Flight Strip
AF	Airway Facilities
AFHA	Arc Flash Hazard Analysis
AFP	Airspace Flow Program
AGIS	Airport Geographical Information System
AIM	Aeronautical Information Management
AIRMET	Airmen's Meteorological Information
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
ALC	Assistant Local Control
AMS	Acquisition Management System
ANSI	American National Standards Institute
AOCNET	Airline Operation Center Network
AOPS	Aircraft, Operator, Pilot Services
APREQ	Approval Request
ARMT	Airport Resource Management Tool
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
AS	Altimeter Setting
ASDE-X	Airport Surface Detection Equipment - Model X
ASOS	Automated Surface Observing System
ASSC	Airport Surface Surveillance Capability
ASTM	American Society for Testing and Materials
AT	Air Traffic
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATO	Air Traffic Organization
AWOS	Automated Weather Observing System
AWS	Airport Weather Services
AWSS	Automated Weather Sensor System
BMP	Bitmap Format
CAA	Clean Air Act
CD	Clearance Delivery
CDM	Collaborative Decision Making
CDR	Coded Departure Route
CDU	Control Display Unit
CFR	Call for Release
CFR	Code of Federal Regulations
CHI	Computer-Human Interface

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CIC	Controller-in-Charge
CIWS	Corridor Integrated Weather System
CM	Configuration Management
CNS/ATM	Communications, Navigation, Surveillance, and Air Traffic Management
COI	Critical Operational Issue
COTS	Commercial Off-the-Shelf
CPDLC	Controller Pilot Data Link Communications
CTD	Controlled Times of Departure
CWA	Center Weather Advisory
DASI	Digital Altimeter Setting Indicator
D-ATIS	Digital Automatic Terminal Information Service
DCL	Departure Clearance
DIRMM	Departmental Information Resources Management Manual
DLSP	Data Link Service Provider
DOC	MS Word File Type
DOD	Department of Defense
DOT	Department of Transportation
DR	Departure Route Assurance DST
DR&A	Data Reduction and Analysis
DST	Decision Support Tool
EA	Enterprise Architecture
EDCT	Expect Departure Clearance Time
EFSTS	Electronic Flight Strip Transfer System
EISA	Energy Independence and Security Act
EO	Executive Order
EOSH	Environmental, Occupational Safety and Health
EPA	Environmental Protection Agency
EPACT	Energy Policy Act
ERAM	En Route Automation Modernization
ESD	Electrostatic Discharge
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FAA	Federal Aviation Administration
FAALC	Federal Aviation Administration Logistics Center
FAT	Factory Acceptance Test
FD	Flight Data
FDIO	Flight Data Input/Output
FDS	Flight Data Services
FID	Final Investment Decision
FIPS	Federal Information Processing Standards
FIS-B	Flight Information Services-Broadcast
FISMA	Federal Information Security Management Act
FIXM	Flight Information Exchange Model
FLM	Front Line Manager
FLS	Fire Life Safety
FNS	Federal NOTAM System
FOC	Flight Operation Center
fPRD	Final Program Requirement Document
FRDF	Facility Reference Data File
FSEP	Facility, Service and Equipment Profile
FSS	Flight Service Station
FTI	FAA Telecommunications Infrastructure
GC	Ground Control

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GDP	Ground Delay Program
GH	Gate Hold
GI	General Information
GM	Ground Metering
GPS	Global Positioning System
GS	Ground Stop
GSIP	Generic Site Implementation Plan
GTS	Global Time Source
HAZMAT	Hazardous Materials
HCFC	Hydrochlorofluorocarbon
HE	Human Engineering
HF	Human Factors
HFDS	Human Factors Design Standards
HTML	HyperText Markup Language
HVAC	Heating, Ventilation and Air Conditioning
IAQ	Indoor Air Quality
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
ID	Identification
IDS	Information Display System
IEEE	Institute of Electrical and Electronics Engineers
IETM	Interactive Electronic Technical Manual
IFR	Instrument Flight Rule
ILSP	Integrated Logistics Support Plan
IOA	Independent Operational Assessment
IRD	Interface Requirements Document
ISO	International Standards Organization
ISR	In-Service Review
ISS	Information Systems Security
IT	Information technology
ITWS	Integrated Terminal Weather System
JHA	Job Hazard Analysis
JMS	Java Messaging Service
JPEG	Joint Photographic Experts Group
JPG	JPEG Format
LAN	Local Area Network
LC	Local Control
LCGS	Low Cost Ground Surveillance
LLWAS	Low Level Windshear Alert System
LMI	Logistics Management Information
LOA	Letters of Agreement
LOTO	Lock-Out Tag-Out
LRU	Line Replaceable Unit
LSA	Logistics Support Analysis
LVAT	Low Visibility Alarm Threshold
M&C	Monitor and Control
METAR	Aviation Routine Weather Report
MicroEARTS	Microprocessor En Route Automated Radar Tracking System
MINIT	Minutes in Trail
MIT	Miles in Trail
MSDS	Material Safety Data Sheets
MTBF	Mean Time Between Failures
MTTR	Mean Time To Restore

## MARKET SURVEY

NAS	National Airspace System
NEPA	The National Environment Policy Act of 1969
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NextGen	Next Generation Air Transportation System
NFPA	National Fire Protection Association
NIDS	NAS Information Display System
NIST	National Institute of Standard and Technology
NNEW	NextGen Network Enabled
NOTAM	Notice to Airmen
NPDES	National Pollutant Discharge Elimination System
NWP	NextGen Weather Processor
ODS	Ozone-Depleting Substances
OEM	Original Equipment Manufacturer
OEP	Occupant Emergency Plans
OI	Operational Improvement
OMB	Office of Management and Budget
OSHA	Occupational Safety & Health Administration
OT&E	Operational Test & Evaluation
PCB	Polychlorinated Biphenyls
PDC	Pre-departure Clearance
PDF	Portable Document Format (Adobe Acrobat Format)
PIN	Personal Identification Number
PIP	Project Implementation Plan
PIREP	Pilot Report
PNG	Portable Network Graphics
POA&M	Plan of Action & Milestones
POC	Point of Contact
PPE	Personal Protective Equipment
PPT	MS PowerPoint File Type
PSP	Program Safety Plan
QA	Quality Assurance
RBDT	Ribbon Display Terminal
RCRA	Resource Conservation and Recovery Act
RMA	Reliability, Maintainability, and Availability
RMLS	Remote Monitoring and Logging System
RMMS	Remote Maintenance Monitoring System
RN	Runway Assignment DST
RS	Remove Strip
RTF	Rich Text Format
RVR	Runway Visual Range
SAT	Site Acceptance Test
SAWS	Stand-Alone Weather Sensor
SDS	Surveillance Data Services
SIGMET	Significant Meteorological Information
SIP	Site Installation Plan
SME	Surface Movement Event
SMS	Safety Management System
SOA	Service-Oriented Architecture
SOC	Service Operations Center
SP	Special Publication
SPCC	Spill Prevention, Control and Countermeasure
SRMGSA	Safety Risk Management Guidance for System Acquisitions
SS	Scheduling and Sequencing DST

## MARKET SURVEY

STA	Scheduled Time of Arrival
STARS	Standard Terminal Automation Replacement System
SUI	Sensitive Unclassified Information
SWIM	System Wide Information Management
SWPPP	Storm Water Pollution Prevention Plans
TAMR	Terminal Automation Modernization and Replacement
TBD	To Be Determined
TBFM	Time-Based Flow Management
TDLS	Tower Data Link Services
TDWR	Terminal Doppler Weather Radar
TFDM	Tower Flight Data Manager
TFM	Traffic Flow Management
TFMS	Traffic Flow Management System
TIB	Technical Instruction Book
TIMS	TDLS Information Management System
TMC	Traffic Management Coordinator
TMI	Traffic Management Initiatives
TMS	Traffic Management Services
TRACON	Terminal Radar Approach Control
TSCA	Toxic Substances Control Act
TSWIM	Terminal SWIM
TX	Taxi Route Generation DST
TXT	Text Format
UCWA	Urgent Center Weather Advisory
UDDS	Universal Digital Data Standard
UFAS	Uniform Federal Accessibility Standard
UIS	User Interface Services
USC	United States Code
UTC	Coordinated Universal Time
VFR	Visual Flight Rule
VIP	Very Important Person
VOID	Virtual Operator Interface Device
WARP	Weather and Radar Processor Interface
WJHTC	William J. Hughes Technical Center
WME	Wind Measuring Equipment
WR	Weather Request
WSP	Weather System Processor
WTMD	Wake Turbulence Mitigation for Departure
WX	Weather Message
XLS	MS Excel File Type
XML	Extensible Markup Language

# MARKET SURVEY

## APPENDIX II: Glossary

Access Control – The process of limiting access to resources and objects based on the identity of subjects and/or groups to which they belong. This is accomplished through the use of appropriate physical, procedural, and hardware/software controls.

Adaptation – The process by which automation application software is made unique to provide the required service at a specific site.

Air Surveillance – The surveillance of targets above the ground and water.

Aircraft Separation Standards – The standards of spacing of aircraft to achieve their safe and orderly movement while in flight, landing and taking off, and taxiing.

Airport Arrival Corridor(s) – These are volumes of airspace used for the arrival flows into an airport. They are delineated in Letters of Agreement (LOA's).

Airport Authority – A designated government or contract entity charged with the responsibility of operating an airport within the requirements of the Federal Aviation Regulations including 14 CFR Part 139-Airport Certification.

Airport Coverage Area – This is the area delegated to the tower to provide terminal services.

Airport Movement Area – The runways, taxiways, and other areas of an airport which are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas.

Alarm – An audio/aural signal that indicates a condition relating to the effective performance of duties. The condition or message requires the operator or maintainer to take immediate action or indicates that a significant update in information necessary for the effective performance of duties is available.

Alert – A visual indication of a condition relating to the effective performance of duties. The condition or message requires the operator or maintainer to take immediate action or indicates that a significant update in information necessary for the effective performance of duties is available.

Amendment Messages – A message that is used to initiate a Route Readout Request, a Remarks Readout Request, and to modify, add to, or delete previously filed flight plan data, NAS Fields 02 through 11 and selected ICAO field/elements.

And – “And” is used in this specification as the logical “AND.” For a requirement which refers to x “and” y, both x and y shall be satisfied.

Application Services – A set of software functions that together provide an automated application capability (e.g., accounts payable, word processing, email, etc.)

Archive – A long term storage area for backup copies of data or for data that is no longer in active use

Authentication – Verifying the identity of a user, process, or device, often as a prerequisite to allowing access to resources in an information system.

Authenticator – The means used to confirm the identity of a user, processor, or device (e.g., user password or token).

Authorization (to operate) – The official management decision given by a senior organizational official to authorize operation of an information system and to explicitly accept the risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation based on the implementation of an agreed-upon set of security controls.

Authorization Boundary – All components of an information system to be authorized for operation by an authorizing official and excludes separately authorized systems, to which the information system is connected.

Authorizing Official – A senior (federal) official or executive with the authority to formally assume responsibility for operating an information system at an acceptable level of risk to organizational operations

# MARKET SURVEY

(including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation.

Automatic Transmission – The capability to automatically initiate the transmission of the clearance to the aircraft immediately following a pilot request. Automatic transmission allows the controller (or system in the case of AUTOMODE) to generate a departure clearance when flight data is available and placed in a queue until the pilot requests the clearance. Initial departure clearances are not sent until requested to allow the pilot to receive the data when required in the cockpit.

AUTOMODE – The capability for automatically creating Departure Clearances by the system and automatically transmitting them to the end user when requested without any controller input or action.

Availability – The probability that a system or constituent piece may be operational during any randomly selected instant of time or, alternatively, the fraction of the total available operating time that the systems or constituent piece is operational. A fraction whose numerator is the Mean Time Between Failures (MTBF) and whose denominator is the sum of the MTBF plus the Mean Time To Restore (MTTR) a service.

Baseline – The initial configuration of any item (including software, hardware, requirements and documentation) which is formally designated and managed by a unique identifier and which is "frozen" at a specific time during the configuration items life cycle. The baseline, plus any approved changes, constitutes the current configuration.

Boundary Protection – Monitoring and control of communications at the external boundary of an information system to prevent and detect malicious and other unauthorized communications, through the use of boundary protection devices (e.g., proxies, gateways, routers, firewalls, guards, encrypted tunnels).

Certification – The technical confirmation that an ATC system is providing, and/or is capable of providing, the specified service to the user at any given time.

Coherence – The quality or state of cohering, especially a logical, orderly, and aesthetically consistent relationship of parts

Cold Start – Re-initializing software and hardware by powering the system hardware off, then on.

Command – Data input through file, pointers, menu selection, function keys, keystroke combination or other entry mechanisms.

Compatible – Orderly, efficient integration and operation with other elements in a system with no modification or conversion required

Completeness – All required fields have data.

Compliance – An indication of whether a flight has departed within a specified time frame of the assigned departure time (EDCT, Controlled Departure Time (CDT)).

Confidentiality – Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information.

Confirmed – Having been ratified; verified.

Consistent – Consistent means adhering to the same principles with minimal variation.

Data – Information in a specific physical representation, usually a sequence of symbols that have meaning; especially a representation of information that can be processed or produced by a computer.

Data Block – Letters and numerals used to show identification, altitude, beacon code, and other information concerning a target on a radar display.

Data Tag – The alphanumeric information associated with a target icon, including call sign.

Database and Content Management System (DCMS) – A database and content management system is software that manages structured data as well as unstructured content such as documents.

Degradation – A decline to a lower condition, quality, or level.

Departure Clearance Messages (DCL) – The DCL service is a "request/reply" service. The air crew in the cockpit submits a data link request to the ATSP and requests a departure clearance message. The aircraft has to be equipped with avionics that are capable of utilizing the protocol for DCL and the airline's crews have to be able to utilize the DCL message from the terminal facility. DCL is a planned service in TDLS.



# MARKET SURVEY

Departure Corridors – A defined parcel of airspace, usually defined by Letters of Agreement between ATC facilities, that route departing aircraft on specific routes for the purpose of traffic deconfliction and mitigation of delays.

Depot – A facility that serves as the major logistic support facility for on-site and central maintenance activities. The depot may return items for repair to a vendor facility when more cost effective. It supports the repair, alignment, calibration, complete overhaul and rebuilding of complex equipment.

Distinguish – To make noticeable or different; set apart.

Distribute – Point-to-point transmission from a source to multiple destinations.

External Information System (or Component) – An information system or component of an information system that is outside of the authorization boundary established by the organization and for which the organization typically has no direct control over the application of required security controls or the assessment of security control effectiveness.

External Information System Service – An information system service that is implemented outside of the authorization boundary of the organizational information system (i.e., a service that is used by, but not a part of, the organizational information system) and for which the organization typically has no direct control over the application of required security controls or the assessment of security control effectiveness.

External Information System Service Provider – A provider of external information system services to an organization through a variety of consumer-producer relationships including but not limited to: joint ventures; business partnerships; outsourcing arrangements (i.e., through contracts, interagency agreements, lines of business arrangements); licensing agreements; and/or supply chain exchanges.

External Interface – A connection to data or control instructions which originate outside an application or system boundary.

External Network – A network not controlled by the organization.

Facility Notations – Locally added information to flight data and/or surveillance data.

Federal Information System – An information system used or operated by an executive agency, by a contractor of an executive agency, or by another organization on behalf of an executive agency.

Flight Data – All data applicable to a flight including but not limited to flight plan, flight amendment, and track information.

Flight Operator – A person or organization responsible for operating an aircraft. Flight operator types includes airline, general aviation, military, cargo, and others. Flight operator may refer to any entity within the above types of organizations, such as a Flight Operations Center, dispatcher, or pilot-in-command.

Flight Plan – Specified information relating to the intended flight of an aircraft that is filed orally or in writing with a Flight Service Station (FSS) or an ATC facility.

Flight State – Current flight condition, including At gate, Off-block, Taxiing (including destination; e.g., runway, gate, de-icing pad, maintenance hangar), In queue, Departed, Arriving.

Flight Status – Any logical combination of arrival, departure, or overflight.

Function – Any system capability.

Hazard Area – Locations on the movement area identified for use by aircraft carrying hazardous materials or aircraft experiencing a suspected or verified bomb threat.

Hold – See Hold Function

Hold Function – The ability to make entry that suspends processing of flight data on a flight

Hold Procedure – A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from air traffic control. Also used during ground operations to keep aircraft within a specified area or at a specified point while awaiting further clearance from air traffic control.

Human Error Tolerant – A human-to-system interface designed to trap or mitigate the consequences of a user performing erroneous actions that endanger the safety of the system.

Human Error-Resistant – A human-to-system interface designed to reduce the probability that a human user will perform actions that endanger the safety of the system.

# MARKET SURVEY

Human-Centered Design Processes – Human-centered design is a process in which the needs, wants, capabilities, and limitations of end users of a product are given extensive attention at each stage of the design process.

Identification – The process of verifying the identity of a user, process, or device, usually as a prerequisite for granting access to resources in an IT system.

Impact Assessment – Computerized evaluation of the implications of a Terminal Area event (Weather, Runway closure, etc.) resulting in a reduction of capacity for the Terminal Area concerned. This term also qualifies the quantification of the capacity reduction when such an event occurs.

Information – An instance of an information type.

Information Owner – Official with statutory or operational authority for specified information and responsibility for establishing the controls for its generation, collection, processing, dissemination, and disposal.

Information Security – The protection of information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide confidentiality, integrity, and availability.

Information Security Policy – Aggregate of directives, regulations, rules, and practices that prescribes how an organization manages, protects, and distributes information.

Information System – A discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information

Information System Owner (or Program Manager) – Official responsible for the overall procurement, development, integration, modification, or operation and maintenance of an information system.

Information Technology – Any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency. For purposes of the preceding sentence, equipment is used by an executive agency if the equipment is used by the executive agency directly or is used by a contractor under a contract with the executive agency which: (i) requires the use of such equipment; or (ii) requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. The term information technology includes computers, ancillary equipment, software, firmware, and similar procedures, services (including support services), and related resources.

Information Type – A specific category of information (e.g., privacy, medical, proprietary, financial, investigative, contractor sensitive, security management) defined by an organization or in some instances, by a specific law, Executive Order, directive, policy, or regulation.

Input Device – Any hardware component used by a user to enter data and commands into TFD. Common examples include keyboards, trackballs, mouse and touch panels.

Integrity – Guarding against improper information modification or destruction, and includes ensuring information non-repudiation and authenticity.

Interface – A point of interaction between components, and is applicable at the level of both hardware and software.

Internal Interface – A connection to data or control instructions which originate within an application or system boundary.

Internal Network – A network where: (i) the establishment, maintenance, and provisioning of security controls are under the direct control of organizational employees or contractors; or (ii) cryptographic encapsulation or similar security technology implemented between organization-controlled endpoints, provides the same effect (at least with regard to confidentiality and integrity). An internal network is typically organization-owned, yet may be organization-controlled while not being organization-owned.

Local Configuration – Site specific parameters.

Local Flight Data – Information on aircraft or vehicles that is not exchanged with ERAM via NAS flight plan messages. Local flight data is created to manage ground traffic such as vehicles or VFR flights.

# MARKET SURVEY

Maintainability – A characteristic of design and installation that is expressed as the probability that an item will be retained in, or restored to a specified condition within a given period of time, when the maintenance is performed in accordance with prescribed procedures and resources.

Maintenance – All actions necessary for retaining an item in, or restoring it to, a specified condition. Types of maintenance area: - Corrective Actions performed, as a result of failure, to restore an item to a specified condition. - Preventive Actions performed in an attempt to retain an item in a specified condition by providing systematic inspection, detection, and prevention of incipient failure.

Message Composition (Preview) Area – Provides a user the ability to view information as it is entered prior to sending the message.

Movement Area – The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

Multifactor Authentication – Authentication using two or more factors to achieve authentication. Factors include: (i) something you know (e.g. password/Personal Identification Number (PIN)); (ii) something you have (e.g., cryptographic identification device, token); or (iii) something you are (e.g., biometric). See Authenticator.

Network – Information system(s) implemented with a collection of interconnected components. Such components may include routers, hubs, cabling, telecommunications controllers, key distribution centers, and technical control devices.

Notification – Information provided to the user indicating the occurrence of an event or warning the user of a situation. The notification may be provided visually and/or aurally. Notifications are subdivided by urgency into alarms, alerts, and prompts.

On/In Hold – A manual input showing a flight's progress has been halted (on the ground) awaiting further update.

Operational Position – A functioning ATC position manned by a certificated ATC specialist.

Operational Suitability – Operational Suitability broadly refers to the capabilities of a System to support all operational tasks including support of all problem solving and decision making tasks of the user.

Operational Suitability implies the appropriateness of the functionality and the effectiveness of the TFDM System to support situation awareness and information, error, and workload management

Operational Use – Use of The TFDM system for Air Traffic Control activities as defined in FAA 7110.65

Or – “Or” is used in this specification as the logical inclusive “OR.” For a requirement which refers to x “or” y, x or y or both may be satisfied. In no case does the use of “or” imply that TFDM shall implement only one part of the requirement.

Persistent Data Store – A data store that survives when an application is terminated or a computer is powered-off

PIREPS - Pilot Weather Report – A pilot report of meteorological phenomena encountered by aircraft in flight.

Privileged Account – An information system account with authorizations of a privileged user.

Privileged Command – A human-initiated command executed on an information system involving the control, monitoring, or administration of the system including security functions and associated security-relevant information.

Privileged User – A user that is authorized (and therefore, trusted) to perform security-relevant functions that ordinary users are not authorized to perform.

Process – An executing program.

Prompt – A type of notification providing suggestions or notice of a change in value which is not time critical and/or not safety-related.

Provide – Make available for use; equip or supply.

# MARKET SURVEY

Publish/Subscribe – A messaging exchange pattern where senders (publishers) of messages do not program the messages to be sent directly to specific receivers (subscribers). Publishers are able to broadcast data to the community.

Quick Action Keys – Keys that serve as keyboard short cuts by combining in one key the actions of a sequence of individual keys.

Ramp Tower – A control area that allows personnel to direct aircraft movement from terminal gates to spots and other aircraft movement areas.

Ramp Tower Operator – The entity that has responsibility for the Non-Movement area.

Reconfiguration – Changing the state or interconnection of resources.

Reconstitute – A software recovery function that restores data to a software application after a failure to bring it to current or near current operational state.

Reliability – The degree, often expressed as Mean Time Between Failures (MTBF), that a system or component will perform a required function under specific conditions for a specified period of time.

Remote Monitoring and Logging System (RMLS) – Capability for system monitoring, failure alarm and report, control for the system at unmanned locations, and support for system certification, automated logging and configuration management.

Retransmit – Resend or redistribute data or message.

Revise – To make a corrected, improved, or up-to-date version or arrangement of.

Safety Alert – Aural alarms and visual alerts received from the surface surveillance system.

Scratch Pad – A data field in the data block that is 1) entered by a controller to make special notations concerning an aircraft and 2) entered automatically by the system to present information such as airport and runway destination for an aircraft after passing an adapted location.

Scratch Pad Data – The data in the scratch pad.

Security Categorization – The process of determining the security category for information or an information system. See Security Category.

Security Category – The characterization of information or an information system based on an assessment of the potential impact that a loss of confidentiality, integrity, or availability of such information or information system would have on organizational operations, organizational assets, individuals, other organizations, and the Nation.

Security-Relevant Information – Any information within the information system that can potentially impact the operation of security functions in a manner that could result in failure to enforce the system security policy or maintain isolation of code and data.

Send – Point-to-point transmission from source to a single destination.

Service – A set of functions or capabilities related to a specific context. A service can be considered a container of capabilities associated with a common purpose.

Service Thread – A string of functions that support a service or capability to a user.

Severity levels – The level of the consequence or impact of a hazard in terms of degree of loss or harm.

Shall – The word "shall" is specifically used whenever a specification expresses a provision that is binding or identifies a characteristic that a system shall possess in order to be acceptable to the acquirer.

Silence – Put an end to a noise or sound.

Space Holders – Artificially placed slots between aircraft to allow for input of additional traffic if the situation warrants (equivalent to a blank strip)

SPOT OUT – The time the flight exits the movement area.

Stereo Flight Plan – A flight plan using a stereo route.

Stereo Route – A routinely used route of flight established by users and ARTCCs identified by a coded name; e.g., ALPHA 2. These routes minimize flight plan handling and communications.

Store – Information that is retained in such that it is readily available for use.

# MARKET SURVEY

Subscribe – See Publish/Subscribe.

Suppress – Temporarily discontinue an alarm or alert.

Surface Event – Components of the surface schedule, including off-block time, movement area entry time, and departure time.

Surface Movement Event Accuracy – The qualitative accuracy of event reporting through the TFDM system to the NAS subscriber with a probability of less than 5% of a false report.

Surface resources – Elements of the airport surface infrastructure, such as runways, taxiways, and de-icing facilities.

Surface Surveillance – Surveillance of aircraft and vehicles on the ground and/or water.

Surface Surveillance Data – An electronic presentation of aircraft and vehicle locations on the airport movement area.

Surface Vehicle Data – An electronic presentation of vehicle locations on the airport movement area.

Surveillance Data – The set of system messages received from surveillance systems includes all surface operations.

Surveillance System Safety Alerts – These are alerts currently provided by ASDE-X when an aircraft is in close proximity to the runway with another aircraft on final approach or on runway for departure.

SWIM Compliant – Verified conformance to SWIM Governance Policies. The policies are divided into three categories: Strategic Policies governing the management of standards, Design-Time Policies governing the application of standards by developers, and Runtime Policies governing the standards of service behavior.

System Initialization – To prepare a computer system for use by loading initial programs for system operation.

Target – The indication shown on an analog display resulting from a primary radar return or a radar beacon reply.

Target Symbol – A computer-generated indication shown on a radar display resulting from a primary radar return or a radar beacon reply.

Taxi Route (TX) – The path designated by the Ground Controller upon which an aircraft will travel while on the ground, usually between a gate and a runway. The Ground Controller may utilize coded or pre-defined taxi routes.

Taxiway and Runway State – The information relating to the open or closed state of the runway and taxiway.

Terminal Area – A general term used to describe airspace in which approach control service or airport traffic control service is provided.

Terminal Automation Track Data – The information received from ARTS/STARS systems on the location of aircraft.

Timeout – A specified period of time that will be allowed to elapse in a system before a specified event is to take place, unless another specified event occurs first; in either case, the period is terminated when either event takes place. Note: A time-out condition can be canceled by the receipt of an appropriate time-out cancellation signal.

Topology – The layout of arcs and nodes that define a network; for an airport surface, the layout of runways, taxiways, other defined areas such as spots, ramps, and run-up pads, and intersections between these elements.

Track – The actual flight path of an aircraft over the surface of the earth.

Traffic Flow Management (TFM) – The regulation and organization of air traffic in order to expedite the stream of aircraft in a holistically efficient manner.

Translate – Convert or be converted into another form or medium.

Update – Revise data based on most current available conditions and parameters.

## MARKET SURVEY

Usability – The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.

Usage Restrictions – Aircraft and vehicle limitations in airport movement and non-movement area.

User – Any human operator of the TFDM system.

User Input – Human interaction with the TFDM system (e.g., keyboard entry, mouse/trackball selection, touch-screen gesture). In a requirement, the text "based on user input" indicates that human interaction with TFDM is needed for the action to occur.

User Preference Sets – Stored values of display set-up parameters individualized for a specific user that are retrieved and applied upon that user's sign-in.

UTC (Coordinated Universal Time) – UTC is the time provided in world-wide time signal broadcasts used in aviation.

Utilization – The number of takeoffs or landings on a runway divided by runway capacity. The utilization may also be calculated across multiple runways to determine the airport utilization.

Visual Flight Rules (VFR) – Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VOID – A specialized user interface to access legacy weather equipment.

Warm Start – Re-initializing the hardware and software on a system without powering the hardware off.



# MARKET SURVEY

## **APPENDIX III: Interface Control (ICD) & Interface Requirements Documents (IRD) References**

Airport Surface Detection Equipment (ASDE-X) Data Distribution (DD) to End Users Interface Control Document (ICD), NAS-IC-34180001, Version 6, April 2, 2008.

Air Traffic Control Data Sources to NAS Information Display System (NIDS) via Web Services Interface Interface Requirements Document (IRD), NAS-IR-32063118, May 21, 2010.

ASOS Controller Equipment Information Display System (ACE-IDS) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-31083118, May 21, 2010.

Automated Surface Observation System (ASOS) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-31063118, May 21, 2010.

Automated Weather Sensor System (AWSS) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-31193118, May 21, 2010.

Digital Altimeter Setting Indicator (DASI) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-82153118, May 21, 2010.

En Route Automation Modernization (ERAM) to SWIM Service Consumer Interface Requirements Document (IRD), Draft, November 9, 2009.

External Systems that use a Ribbon Display Terminal (RBDT) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-31180001, May 21, 2010.

Flight Data Input/Output (FDIO) System to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-82013118, May 21, 2010.

Runway Visual Range System to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-33113118, May 21, 2010.

RMLS Draft NAS-IR-51015108, Remote Monitoring and Logging System (RMLS) to Remote Monitoring Subsystems (RMS) dated 12/20/2010.

Stand Alone Weather Sensor's (SAWS) Via Control Display Unit (CDU) to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-31203118, May 21, 2010.

Traffic Flow Management System-to-Aircraft Situation Display to Industry (TFMS-to-ASDI) Interface Control Document (ICD) for the Traffic Flow Management-Modernization (TFM-M) Program, Final, Release, Contract Number: DTFAWA-04-C-00045, August 24, 2009.

Traffic Flow Management System-to-Airline Operation Center Network (TFMS-to-AOCNET) Interface Control Document (ICD) for the Traffic Flow Management-Modernization (TFM-M) Program, Final, Release, Contract Number: DTFAWA-04-C-0004, August 24, 2009

Voice Recorder Systems that use Global Positioning System (GPS) Time Source (GTS) To NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-32063118, May 21, 2010.

Weather and RADAR Processor to NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-25153118, May 21, 2010.

Wind Measuring Equipment (WME) Climatronics & Loral To NAS Information Display System (NIDS) Interface Requirements Document (IRD), NAS-IR-51143118, May 21, 2010.

# MARKET SURVEY

## APPENDIX IV: References

9 CFR 1926, *Safety and Health Regulations for Construction*

14 CFR 139, *Airport Certification*

29 CFR 1910, *Occupational Safety and Health Standards*

29 CFR 1926, *Safety and Health Regulations for Construction*

29 CFR 1960.20, *Alternate Standard for Fire Safety in Airport Traffic Control Towers*

36 CFR 1194, *Electronics and Information Technology Accessibility Standard*

40 CFR, *Protection of Environment*

40 CFR, Chapter 1, Subchapter I, (Solid Wastes)

40 CFR 61 140-157, *National Emissions Standards for Hazardous Air Pollutants*

40 CFR 82, *Protection of Stratospheric Ozone*

40 CFR 112, *Oil Pollution Prevention*

40 CFR 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*

40 CFR 123, *State Program Requirements*

40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing,, Processing, Distribution in Commerce, AND Use Prohibitions*

49 CFR Chapter 1, *Pipeline and Hazardous Materials Safety Administration, Department of Transportation*

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